TECHNICAL DRAWING

Metal Trades

1

Revised Edition

TEVTA

GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
TRADE TESTING CELL, LAHORE

TTP

T.T.P. Series No.07

Price Rs. 55/-

Introduction to the 'Revised Edition'

In general the second edition of Technical Drawing 1/Metal Trades is a reprint of the first edition. In case of two exercises, however, it was found necessary to change the contents and the sequence slightly. It is therefore, pointed out that sheet No. 14 (14.1,14.2,14.3) and sheet No.25 are no more exactly matching with the respective topics of the Master plan Curriculum.

To increase the possibility of practicing the new skills 20 additional exercises have been added to the course. Their placement within the sequence of the different topics can be found out from the list of contents.

Revised Edition 1994.

The third edition of Technical Drawing 1 (TTP.7) for Metal Trades is in your hand with some changes in the edition. It was felt that some drawings have greater degree of difficulty as compared to the knowledge of the learner of this subject. In view of this, exercises No.5, 6, 7, 9, 12, 14, 19, 27, 28, 30, 33, 35 and 39 are simplified by reducing its degree of difficulty enabling the learner to understand the concepts of drawing easily. Moreover, it was felt that some information material should also be provided alongwith exercises. For this purpose information sheets No.1, 4, 12.1, 30 and 33 have been added. The additional exercises No. 28.1, 29.1, 29.2, 33.2, 41.1, 44 and 44.1 are also included. In order to inculcate the habit of work at home drawing sheets No.1.2, 2.1, 3.1, 28.2, 29.3, 33.3, 35, 39.1, 42 and 44.2 are provided as home assignments.

It is hoped that the changes in this edition will prove useful. Suggestion to improve the series TTP-7 shall be welcomed and appreciated.

Prepared and published under the Pakistan-German Technical Training Programme by:
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING
14-A Babar Block
New Garden Town, Lahore-16.

Lines

For general engineering drawings, the following types of lines are used.

1 — Visible line. (thick continuous)

2 — Dimension line, construction line

3 — Dotted line

4 — Centre line (long thin chain)

5 — Cutting plane line

6 — Short break line

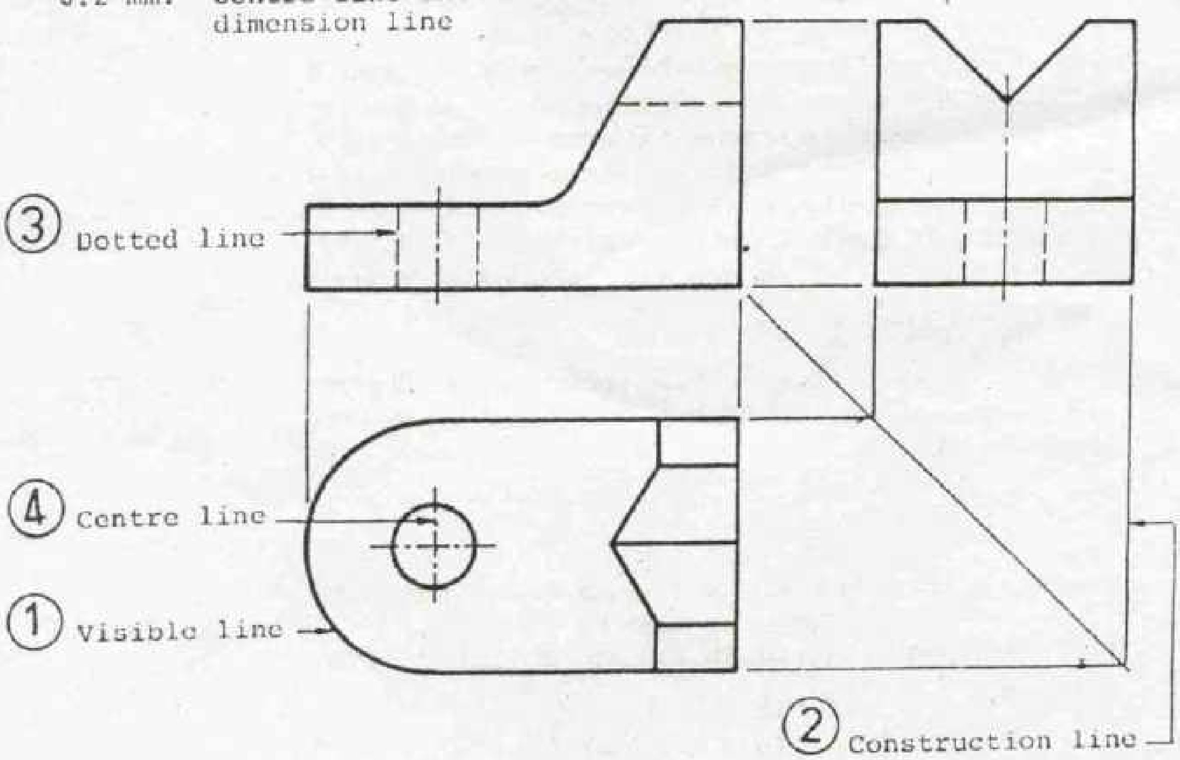
Typical applications of some of the recommended types of lines.

Thickness of Lines

0.5 mm: visible line

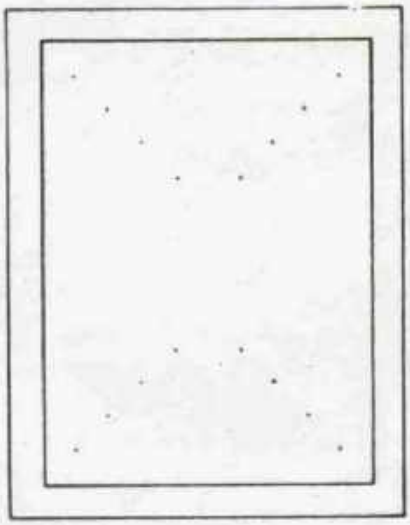
0.3 mm: dotted line

0.2 mm: centre line and dimension line



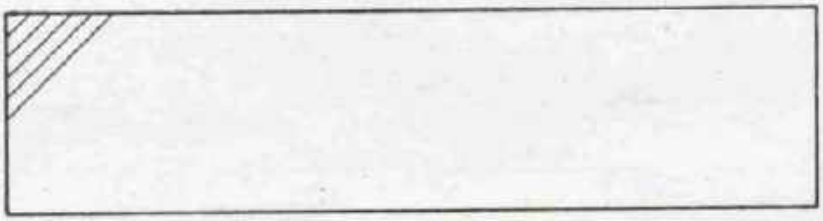
INFORMATION SHEET

Visible outlines



Invisible outlines

Section lining



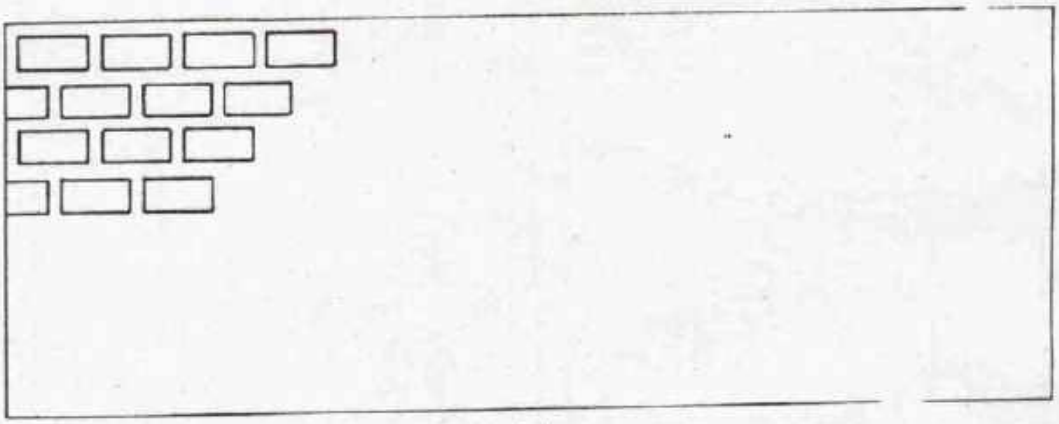
Centre lines

Thickness of Lines

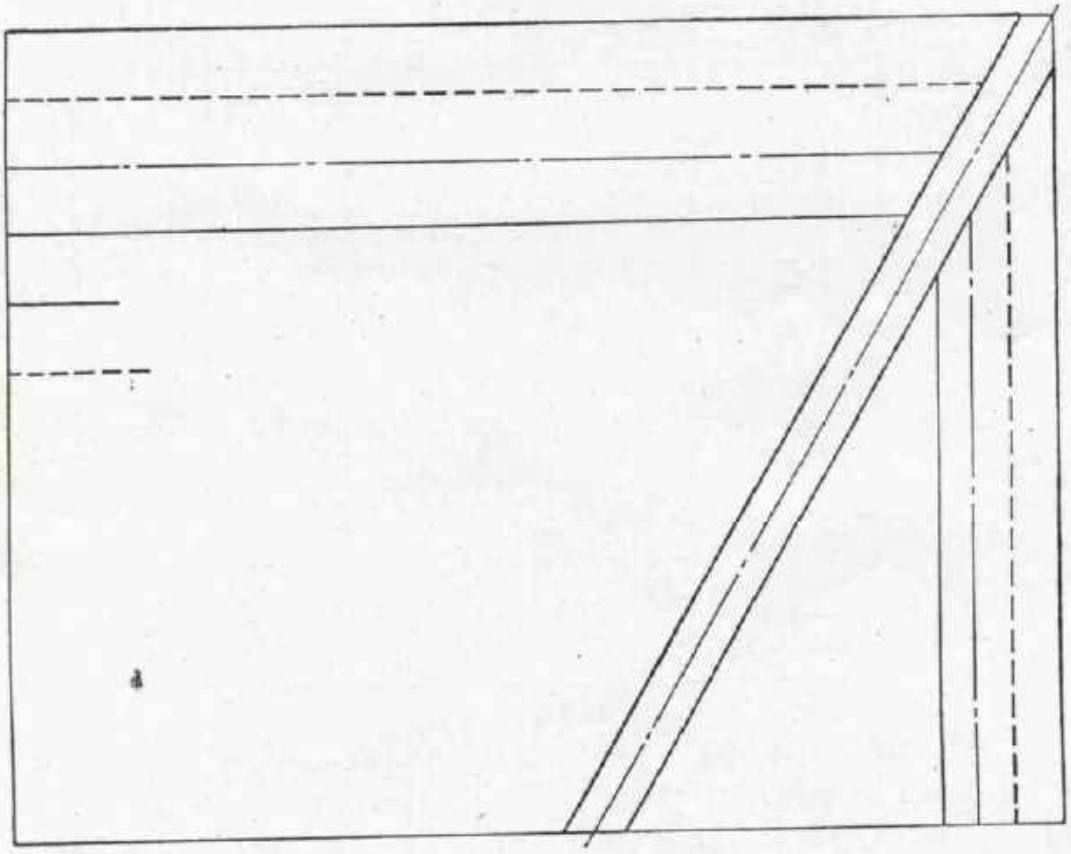
0,5 mm: visible outlines
0,3 mm: invisible edges
0,2 mm: centre lines,
dimension lines

Drawing Instruments

pencil No. HB and H
ruler (30 cm, mm-scale)
square set (45° and 60°)
rubber, pencil sharpener



Complete the pattern in firm line.



Complete the lines according to the given sequence.

Home Assignment No. 1

I	H
L	E
F	T
N	M
K	V
W	X
Y	Z
A	J
U	P
R	B
D	C
O	Q
G	S
1	7
4	0
6	9
2	5
3	8

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z.

GOVT. TECHNICAL TRAINING CENTRE LAHORE.

DRAWING RULES AND STANDARD BOOK.

Home Assignment No. 2

k	v
w	x
z	j
y	l
t	tt
f	r
n	h
m	u
c	a
d	q
g	o
p	b
e	s

Drawing No 2

Lettering Exercises

Standard : DIN 17

1st Semester

Material : St 37

Scale 1 : 2,5

Sketching from Models

Sketching from Models. Drawing from Models.

Exercise No.2 1st Semester. Material : St 37

a b c d e f g h i j k l m n o p q r s t u v w x y z.

Home Assignment No. 3

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

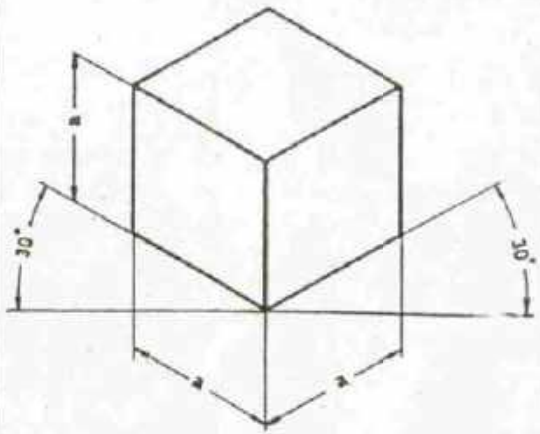
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing No. 4

PICTORIAL DRAWING

(INFORMATION SHEET)

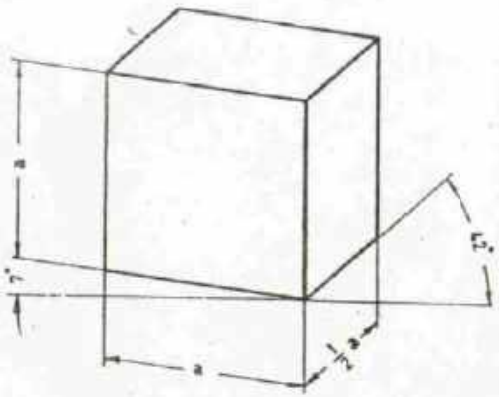
ISOMETRIC PROJECTION



All dimensions are given in equal scale.

a = Actual size

DIMETRIC PROJECTION

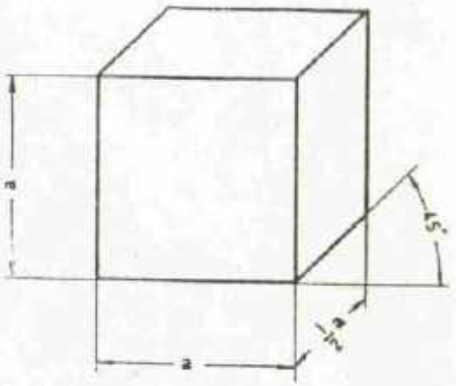


Perpendicular dimensions and dimensions parallel to 7° axis are given in full scale.

Dimensions parallel to 42° axis are reproduced in half their true length.

a = Actual size

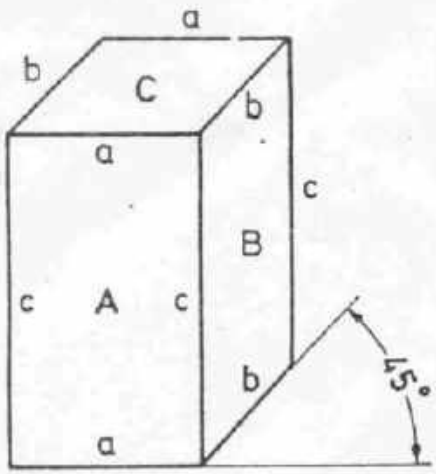
OBLIQUE PROJECTION



An oblique with an oblique edge of 45° is called "Cavalier Projection".

Oblique dimensions are reduced to half of their true length.

a = Actual size



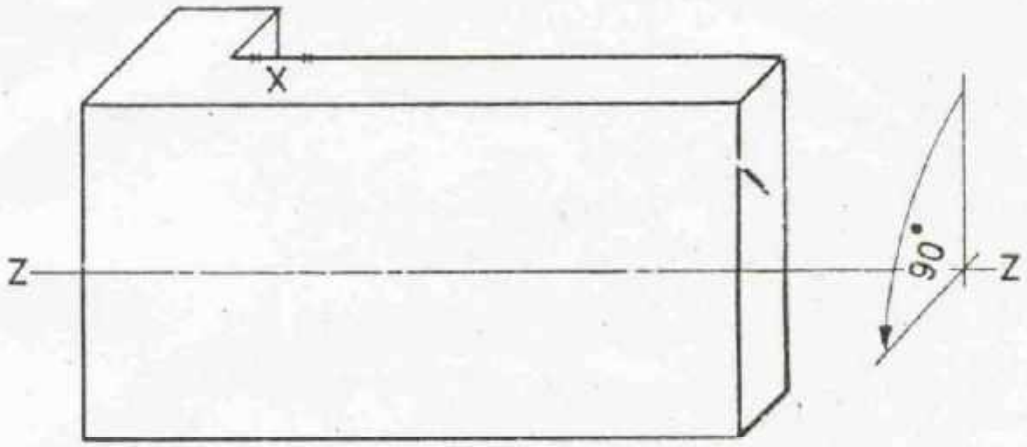
The rectangular prism (a= 30 mm, b= 40 mm, c= 50 mm) is printed in cavalier projection.

Area "A" is represented true to size and shape.

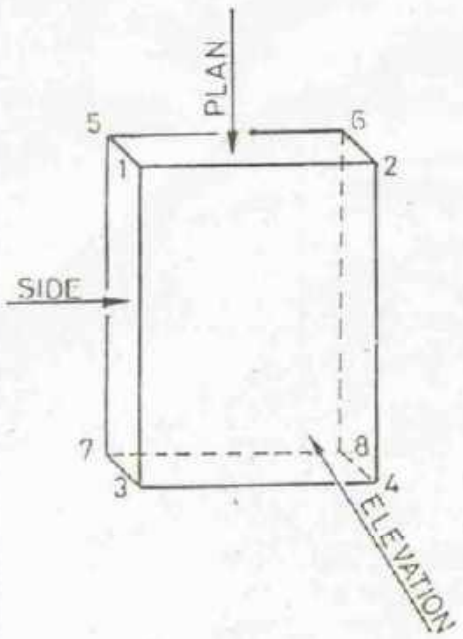
The third dimension is shown under an angle of 45°. The length of "b" is half that of the natural size.

The areas "B" and "C" appear distorted.

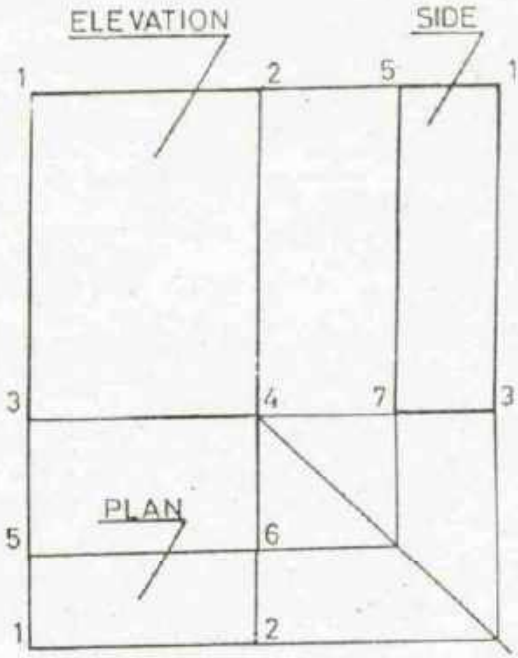
Exercise: Draw the cavalier projection of a flat (60 mm x 20 mm x 200 mm). The cross-section (60 x 20) should be parallel to the picture.



Draw the cavalier projection of the clamp part.
Area "x" shall be parallel to the picture plane.



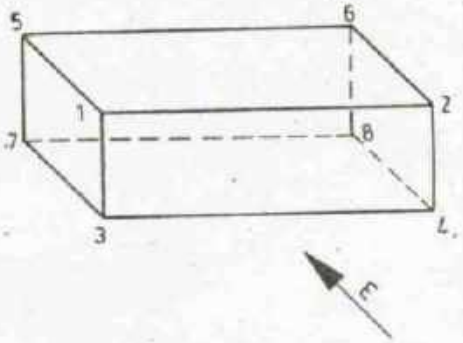
Lengths 1-5 and 2-6 are half those of the true size.

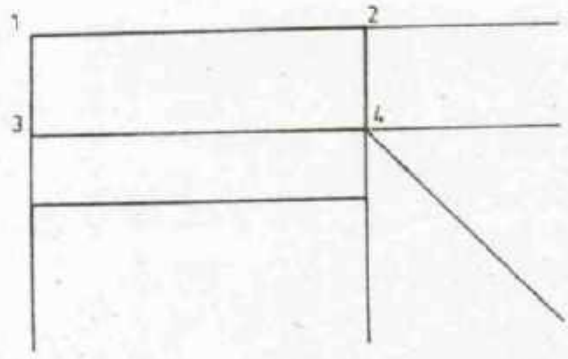


In engineering drawings the true shapes and sizes of the various surfaces have to be shown.

Exercise. Draw the side and plan views of the given object.

Mark the visible corners in all three views with the corresponding numbers.



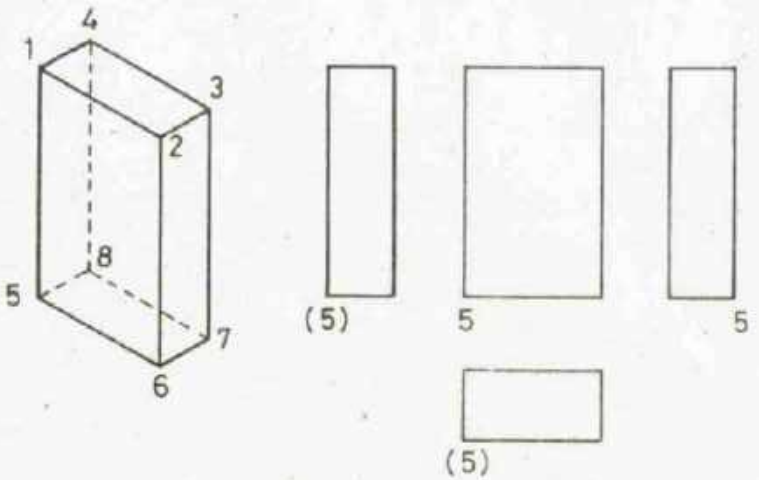


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

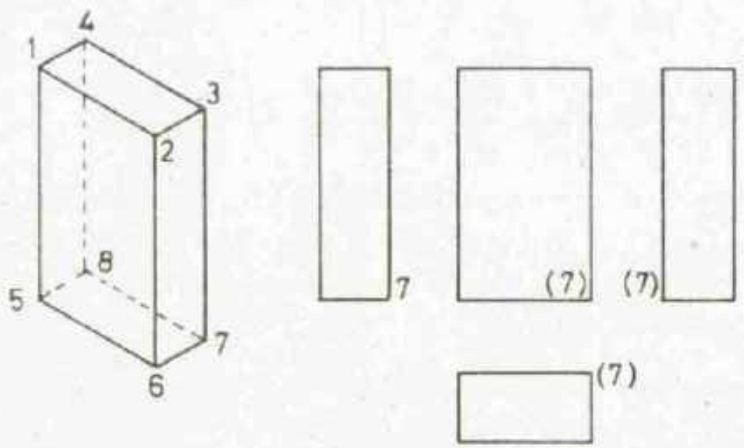
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing No. 7

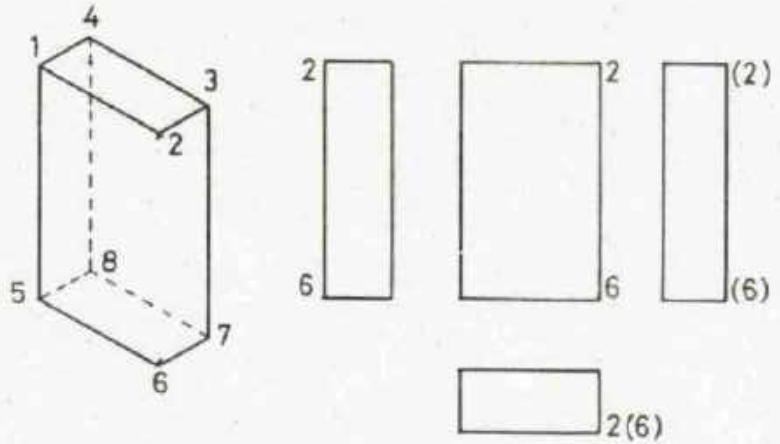
Finding corners



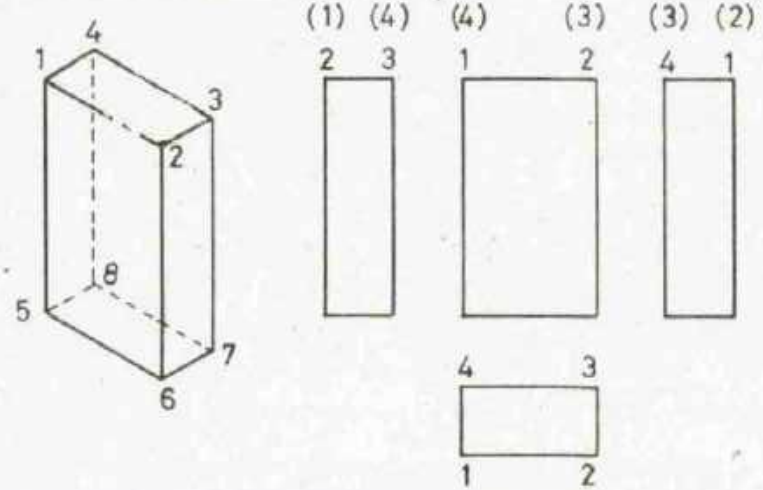
Finding corners



Finding edges



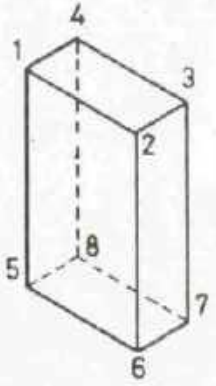
Finding surfaces



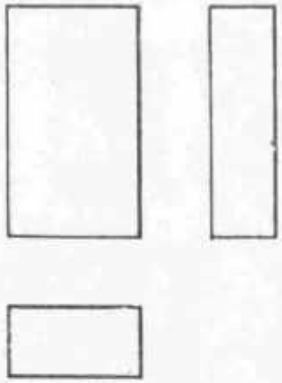
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

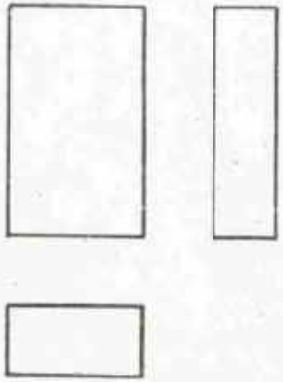
Technical Drawing No. 8



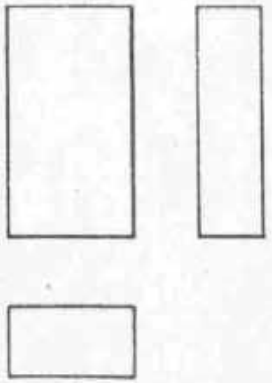
Transfer corners 1 and 7 into the three views!

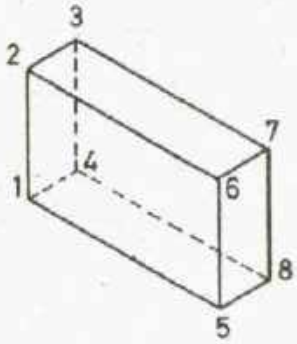


Transfer edge 5-6 into the three views!

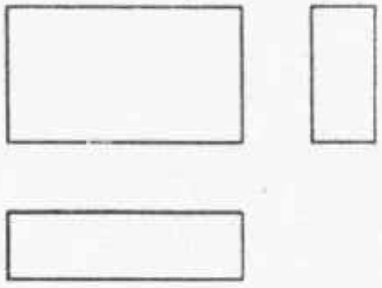


Transfer surface 2-3-7-6 into the three views!

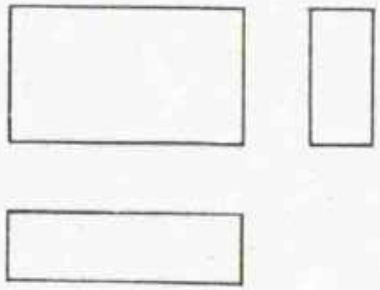




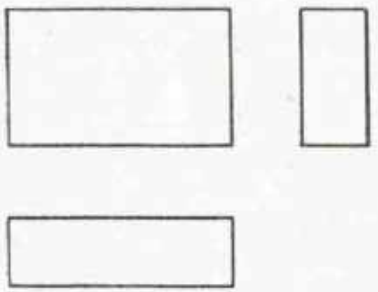
Transfer corners 5 and 6 into the views!



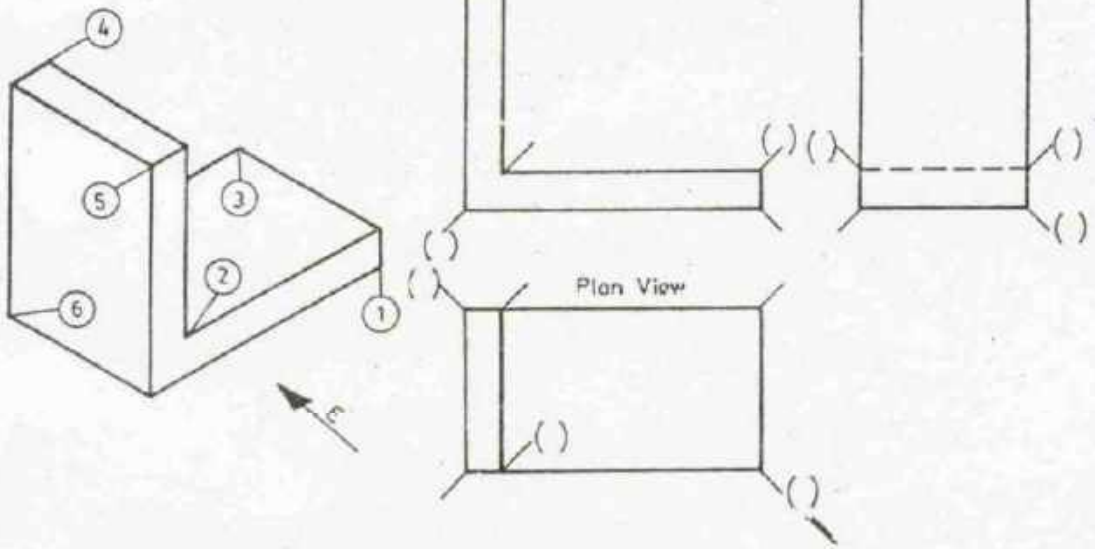
Transfer edge 3-4 into the views!

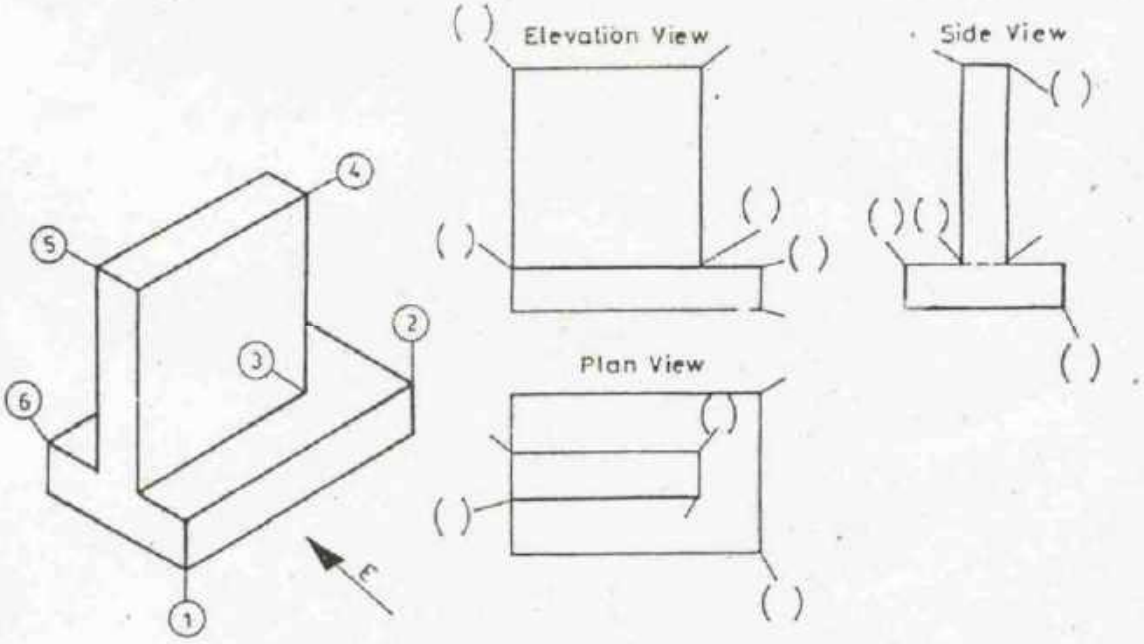


Transfer surface 1-2-3-4 into the views!



ENTER THE CORRECT NUMBERS





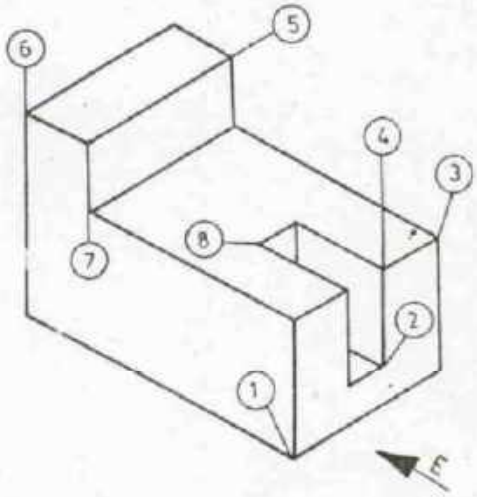
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

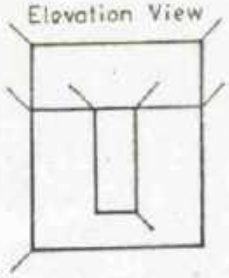
Technical Drawing

No.9

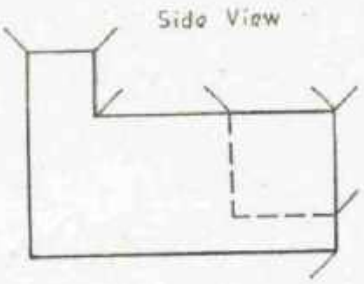
ENTER THE CORRECT NUMBERS



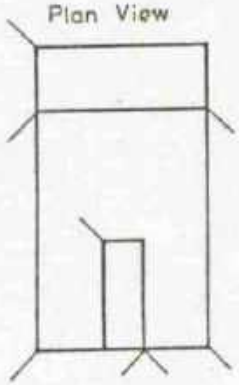
Elevation View

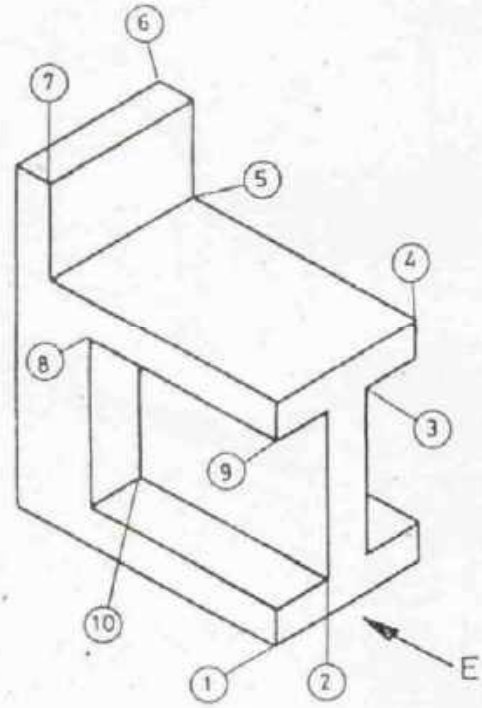


Side View

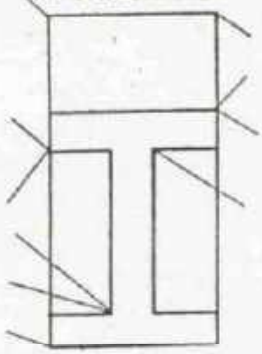


Plan View

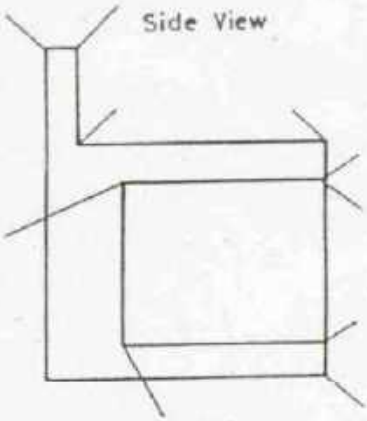




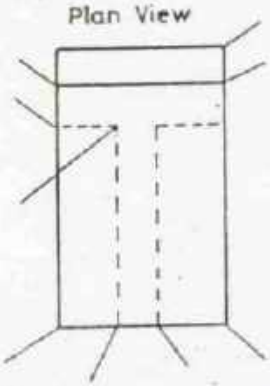
Elevation View



Side View



Plan View

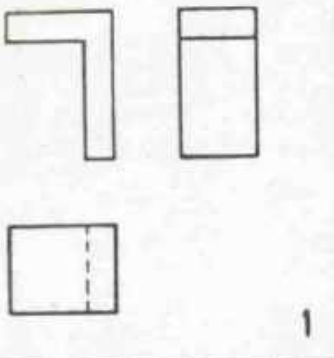


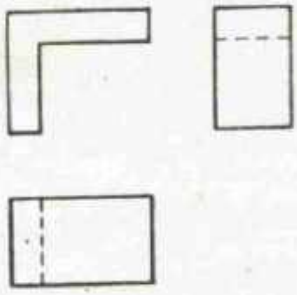
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

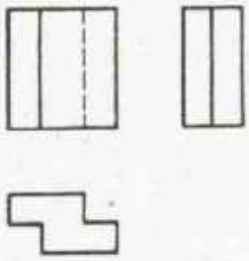
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

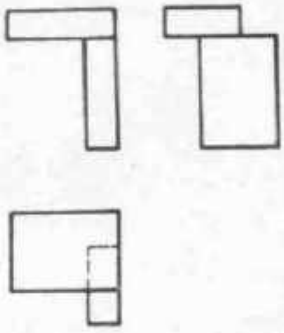
Technical Drawing

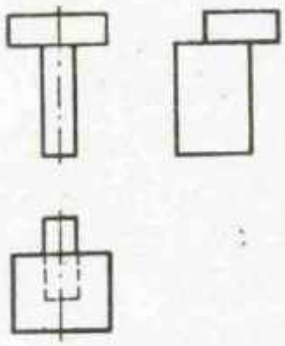
No. 9-1

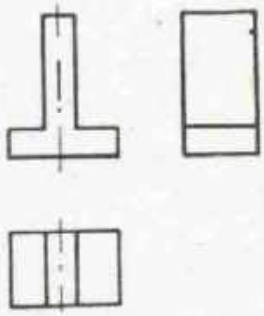


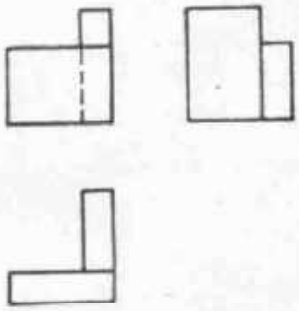


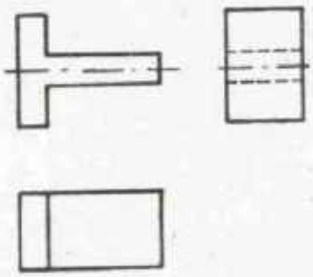


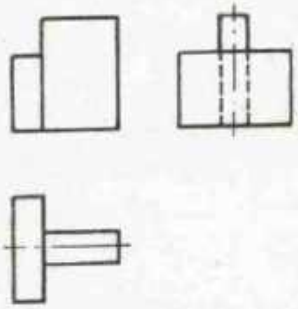


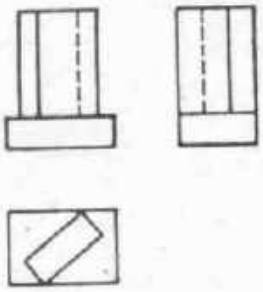










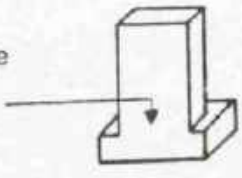


Build each body shown from two equal wooden blocks or matchboxes.

Place it in front of you in a way that the elevation is directed to you.

The assembled body is to be considered one solid part.

Therefore, no edge here!

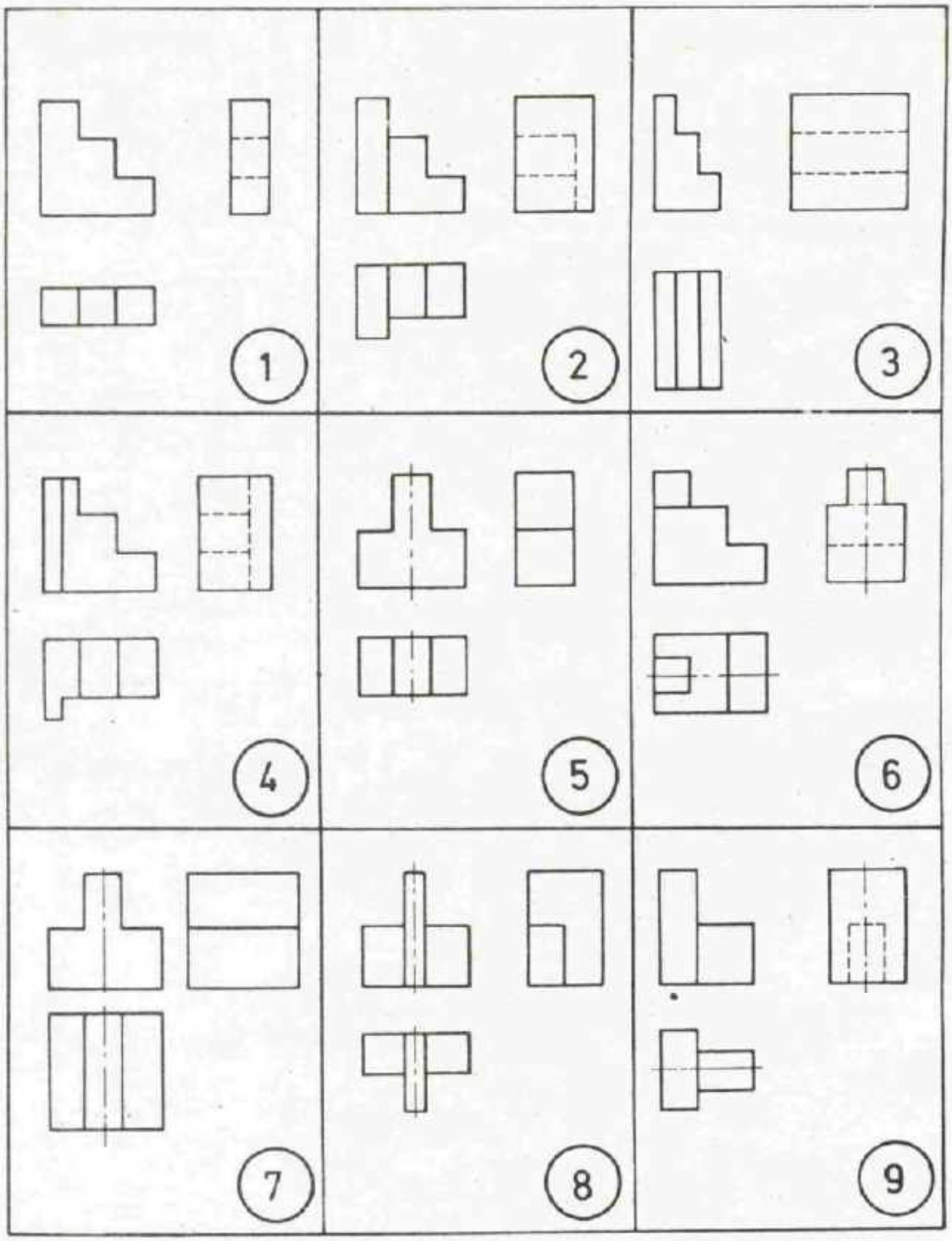


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

No. 10

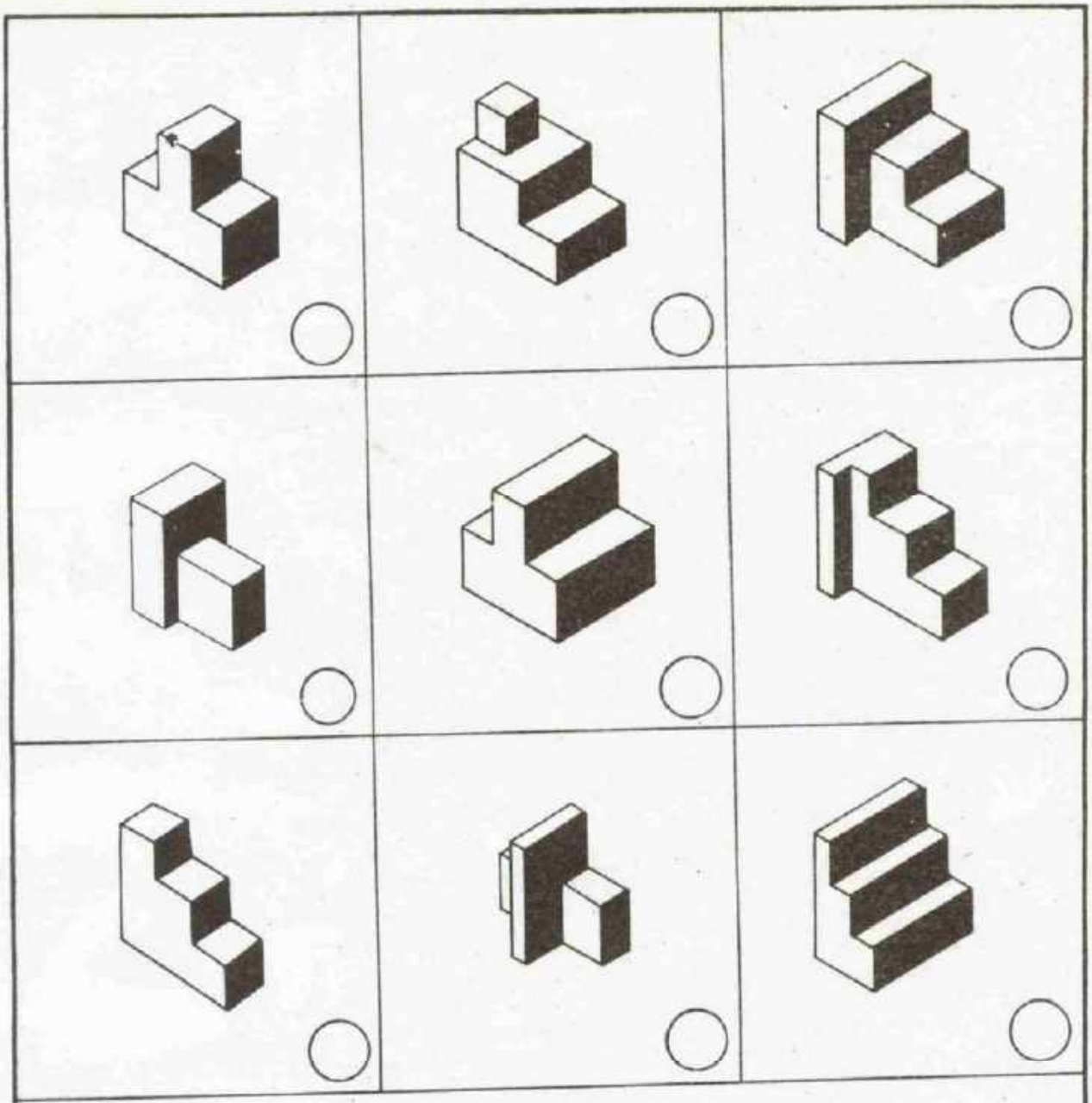


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

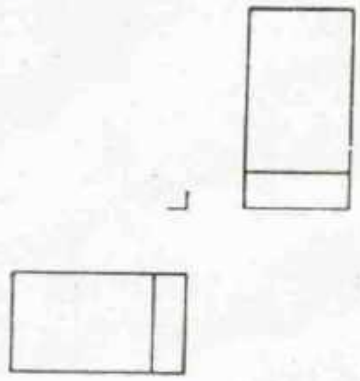
No. 11

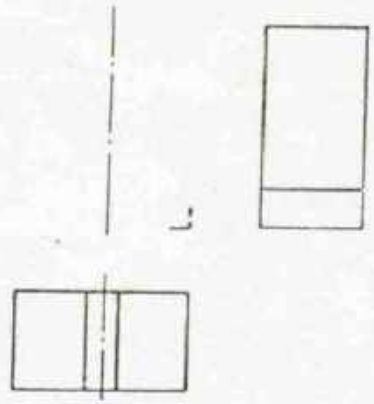


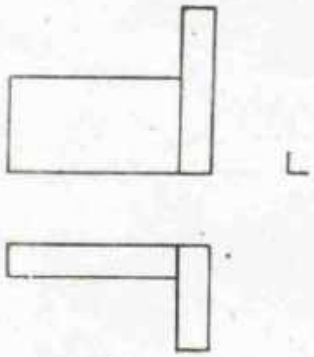
Sheet No. 11 shows nine three-view drawings. Each of these corresponds to one body shown above.

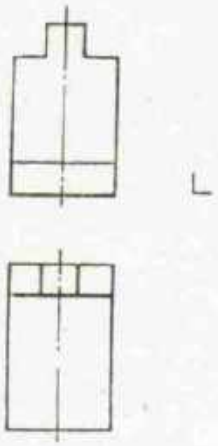
Enter the right number of the three-view drawing into the circle.

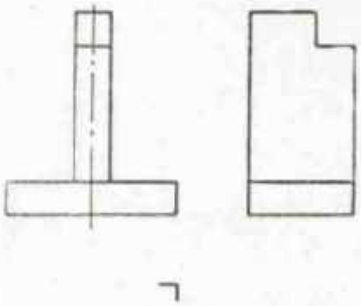
Draw the missing view.

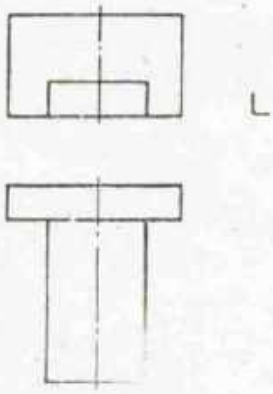












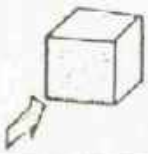
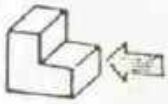
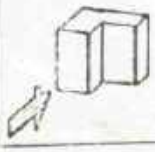
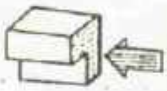
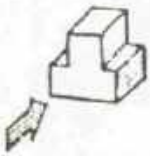
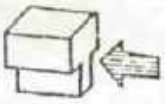
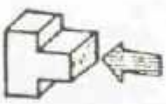
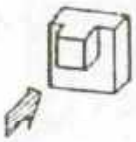
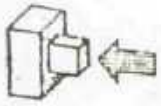
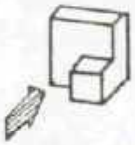
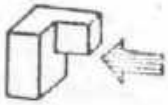
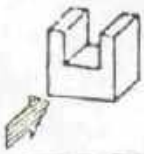
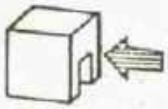
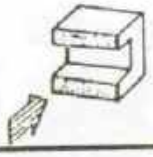
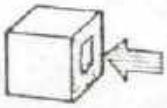
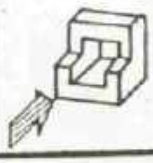
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

No. 12

Find the correct views (1 - 21) belonging to the bodies (A - U).
Example:
When you look at body "A" in the direction of the arrow you will see view "10"

BODY			VIEW				
A 	B 	C 	1 	2 	3 	A	10
						B	
						C	
D 	E 	F 	4 	5 	6 	D	
						E	
						F	
G 	H 	I 	7 	8 	9 	G	
						H	
						I	
J 	K 	L 	10 	11 	12 	J	
						K	
						L	
M 	N 	O 	13 	14 	15 	M	
						N	
						O	
P 	Q 	R 	16 	17 	18 	P	
						Q	
						R	
S 	T 	U 	19 	20 	21 	S	
						T	
						U	

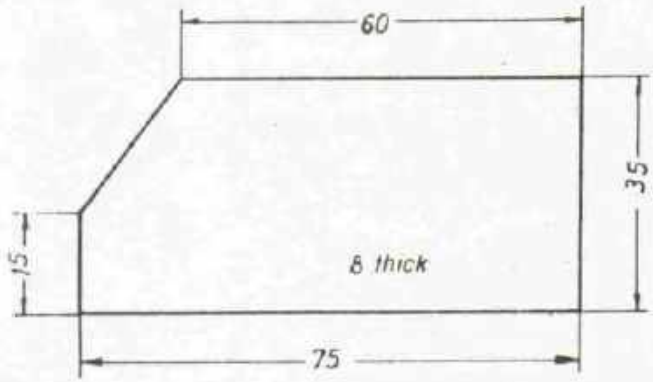
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

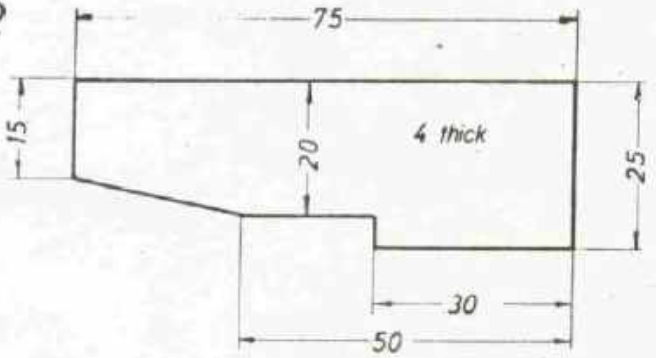
Technical Drawing

No. 13

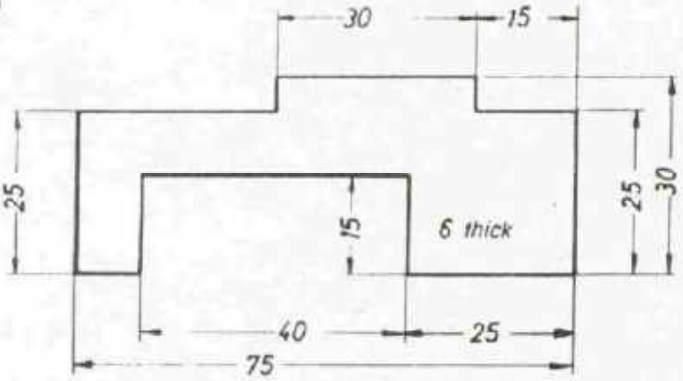
Dimensioning - Flat Workpieces -



2



3

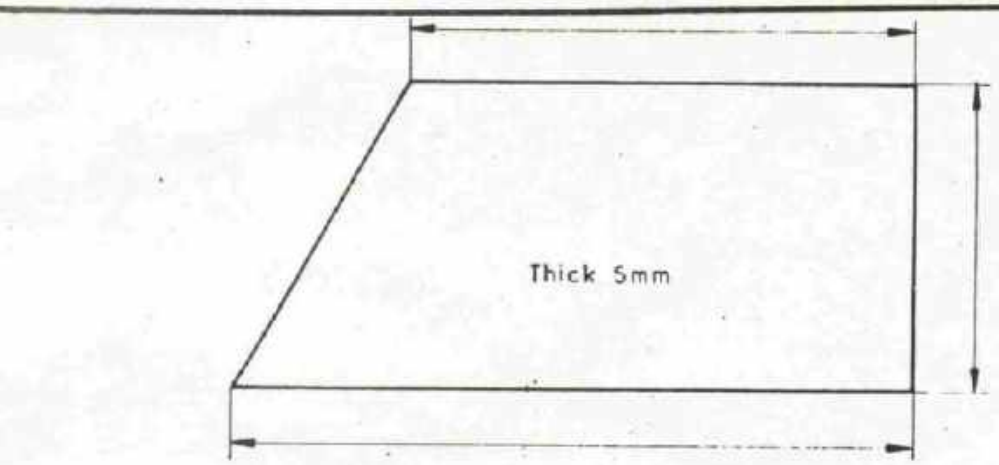


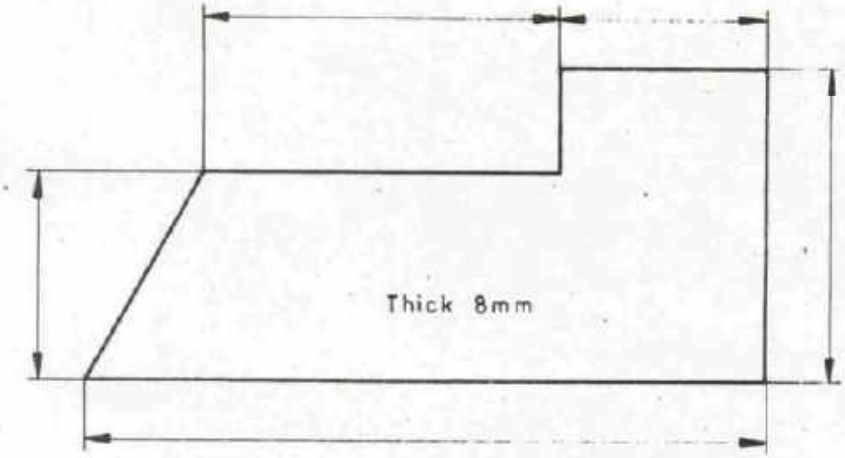
Rules for Dimensioning

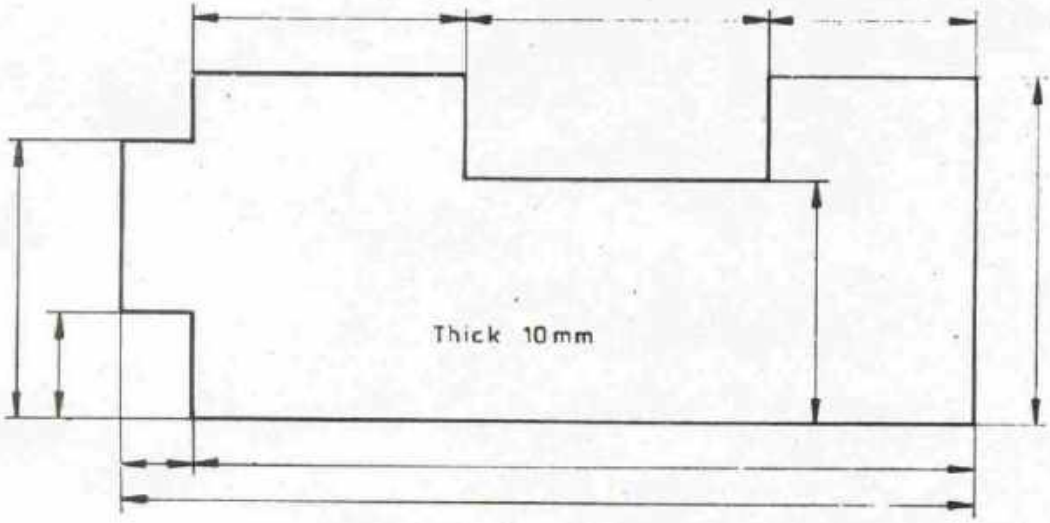
1. Dimension lines should be spaced about 8 mm from the edges of the object.
2. Dimension lines should be interrupted by dimension gaps to take the dimension figures.
3. Parallel dimension lines shall be adequately spaced from one another, the separation being as uniform as possible and not less than 5 mm.
4. No other lines of any kind should run through dimension lines.
5. Projection lines are allowed to run through each other.
6. Dimensioning has to be carried out from suitable reference edges.

Exercise:

Mark the two reference edges in each of the given steel sheets with an "X".





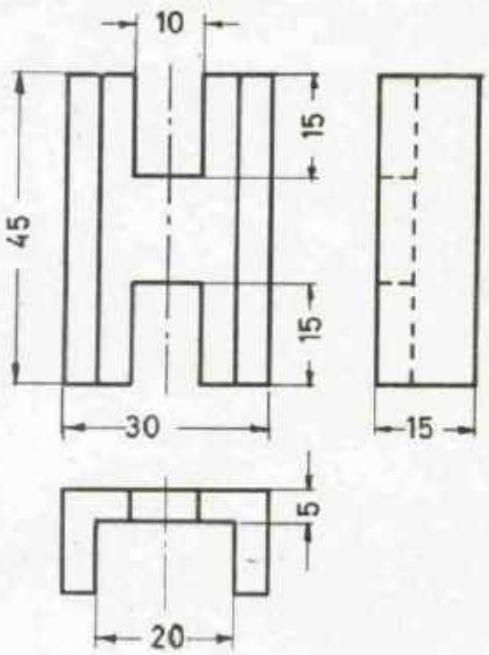


Exercise.

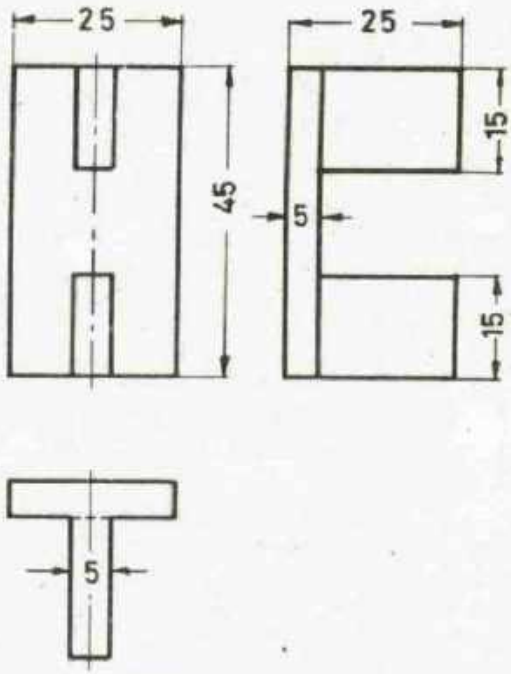
Eenter the dimension.

Dimensioning

Example I

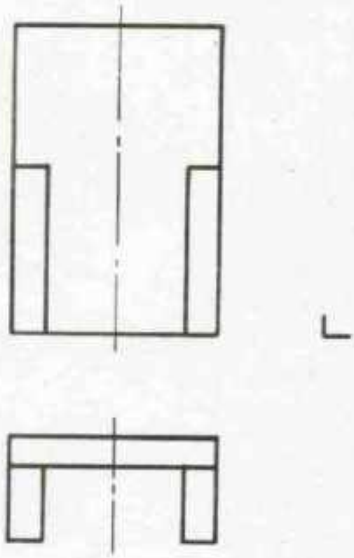


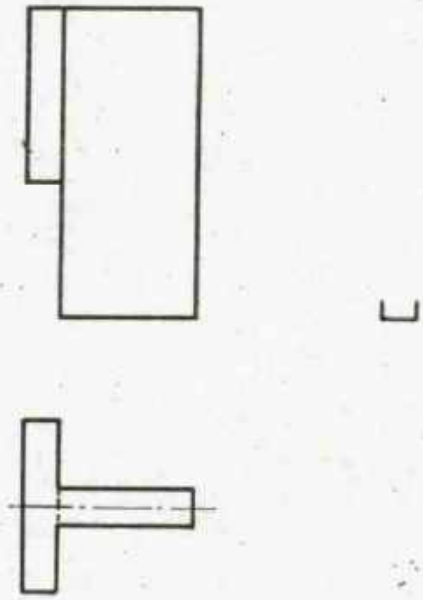
Example II



Note:-Give only as many dimensions as necessary.
-Avoid dimensioning at invisible (broken) lines.
-The centre line (dot-and-dash-line) is an important help for dimensioning symetrical work pieces.

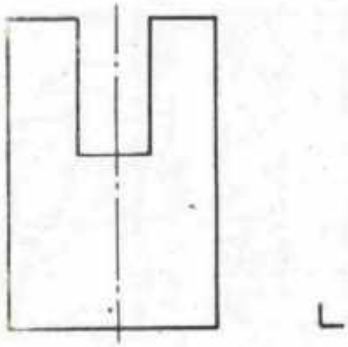
Exercise: Draw the side views and enter the dimensions.

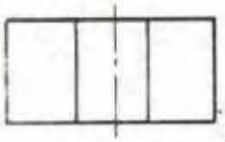


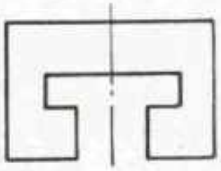


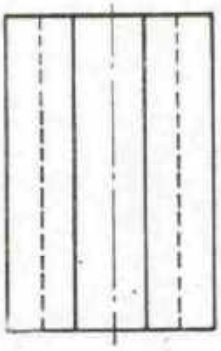
Draw the side views.

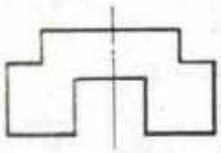
Enter the dimensions.

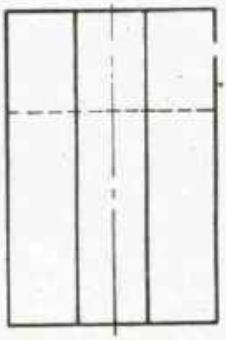


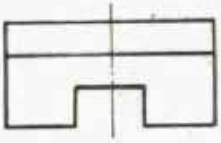












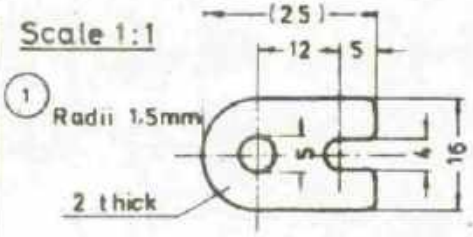
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

No. 15

Scale 1:1

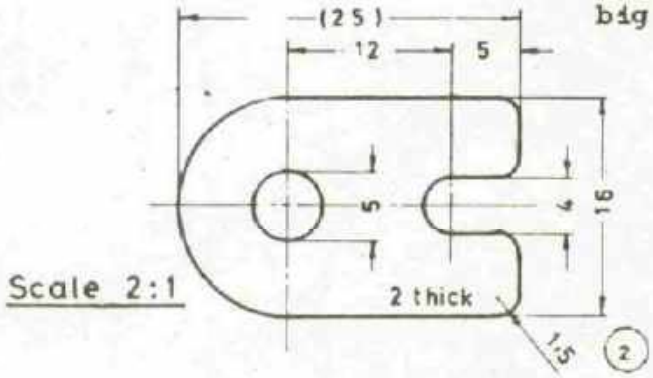


Drawing true to scale

Engineering drawings must always be prepared true to scale.

When the job to be drawn is too small an enlarged scale can be used.

When the job to be drawn is too big a reduced scale can be used.



Scale 2:1

Standard Scales

Full (plain): 1:1

Enlarged: 2:1, 5:1, 10:1

Reduced: 1:2.5, 1:5, 1:10

Note: - the dimensions given in the drawings - also in enlarged or reduced scale - always indicate the actual size.

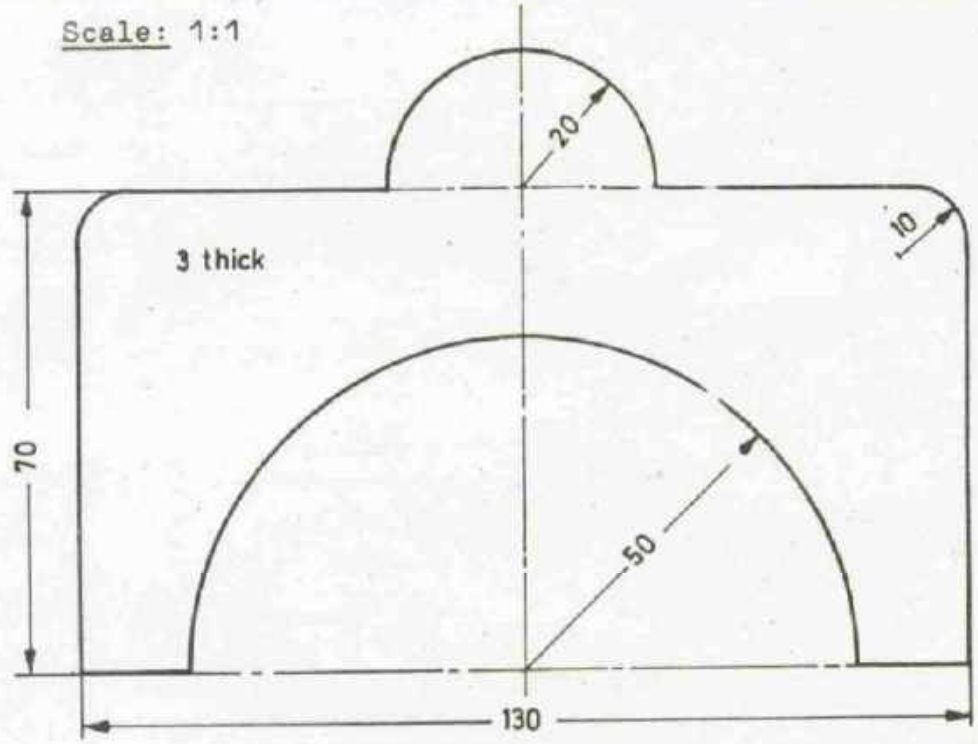
- the size "25" - helpful for cutting the raw length - is given in brackets, since otherwise the drawing would be over dimensioned.
- both ways of indicating the size of the radii (1) and (2) are correct.

Exercise:

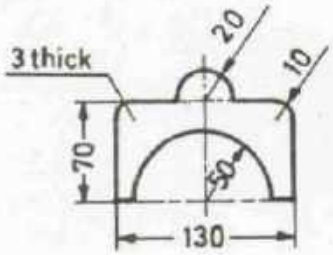
Draw the part in 5 times enlarged scale and enter all dimensions.

Scale 5:1

Scale: 1:1



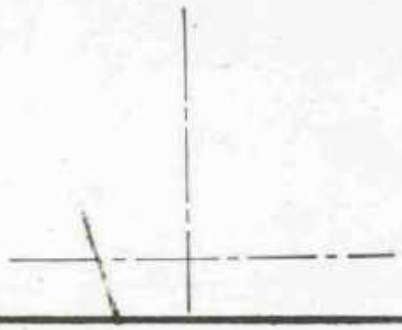
Scale: 1:5



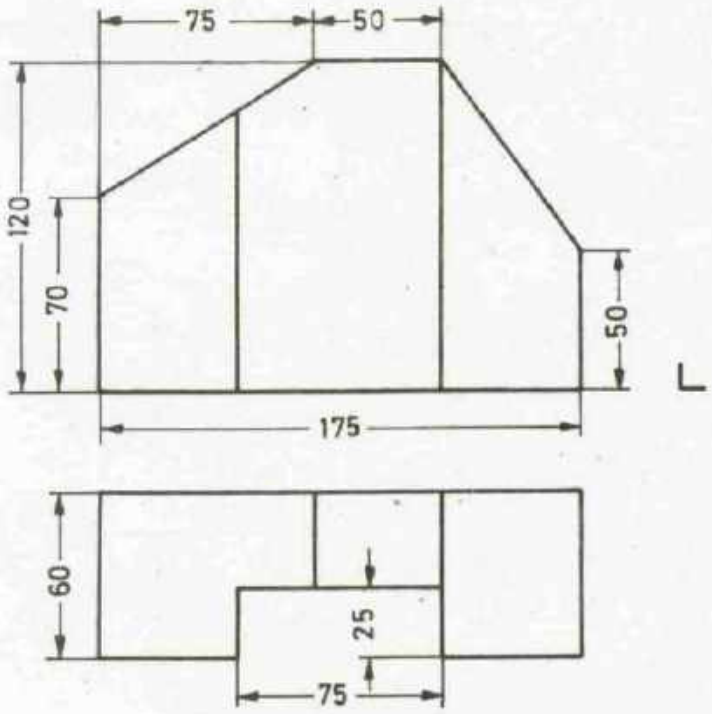
The selection of scale 1:5 proves to be too small for an engineering drawing in this case.

Scale: 1:2.5

Exercise: Draw the steel sheet true to scale.
Enter the dimensions.

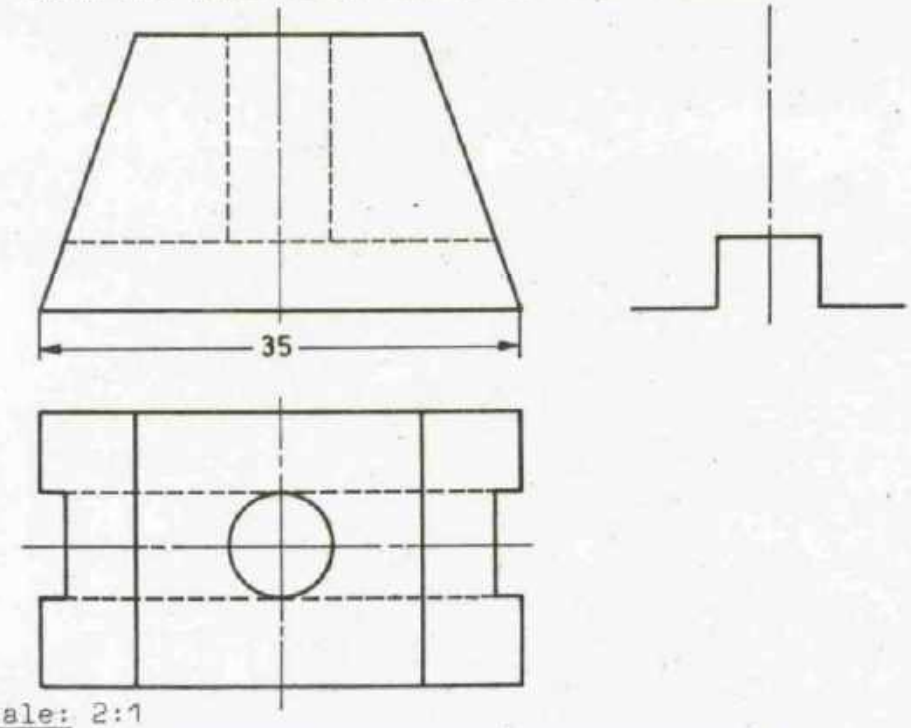


Draw the side view!



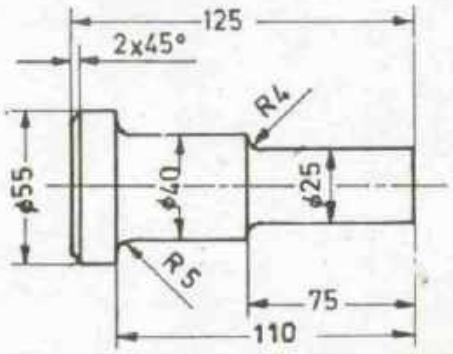
Scale: 1 : 2.5

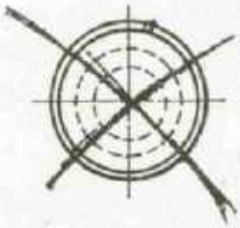
Draw the side view. Enter the dimensions.



Scale: 2:1

Scale: 1:2.5





Cylindrical workpieces

All necessary information can be taken here from the elevation alone.

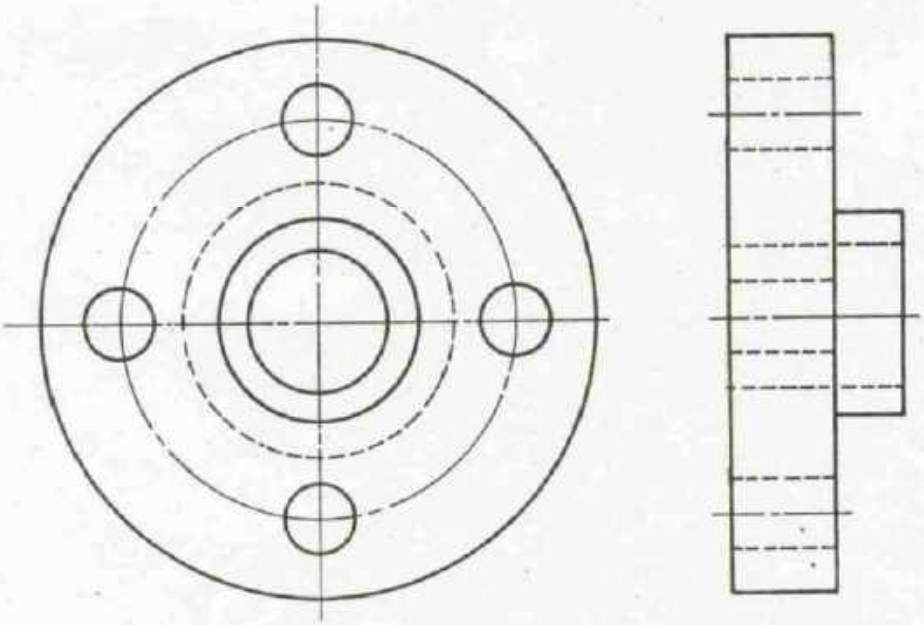
Only this view is therefore required.

Exercise: Draw the bolt in full scale with all dimensions.

Scale: 1:1

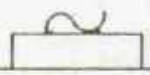
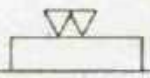
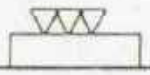
To determine the shape of this flange one view would not be sufficient.

Exercise: Enter the dimensions!



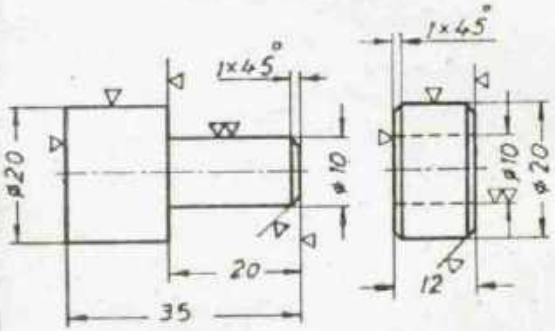
Scale: 2:1

Surface Symbols

	Surface symbols	Surface quality obtained by	Notes
Approximate symbol		Clean casting Clean forging	--
One triangle		Rough machining	Scores may be felt and visible
Two triangles		Smooth machining	Scores still visible to the naked eye
Three triangles		Fine machining	Scores must not be visible any longer

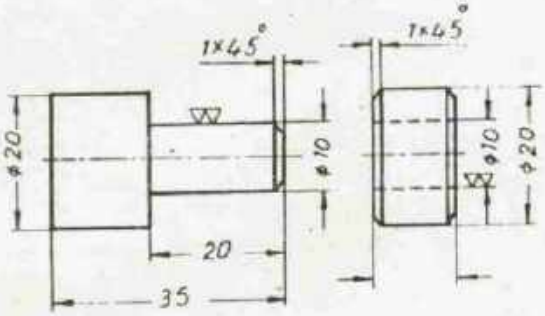
Entry of Surface Symbols

Impractical

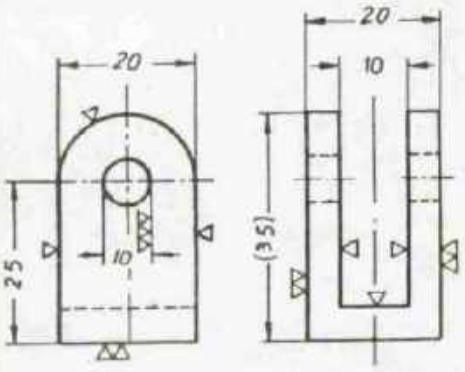


Part 1 Part 2

Practical

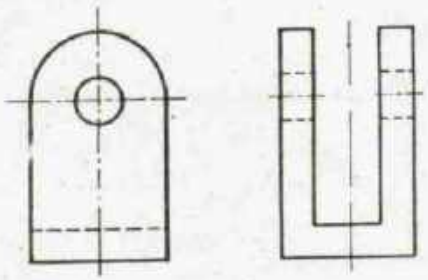


1▽ (▽▽) 2▽ (▽▽)



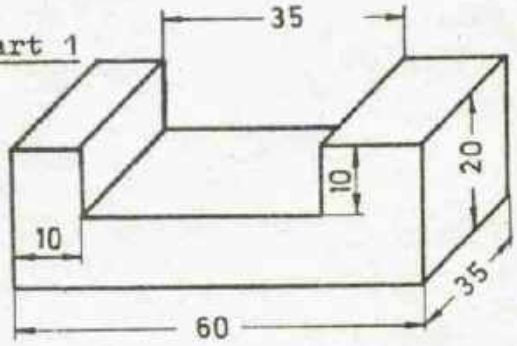
Part 3

Exercise:

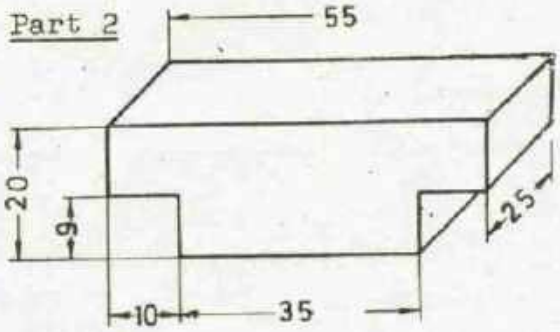


Draw parts 1 and 2 of the prismatic guide way in t ee views each with all necessary dimensions and surface symbols. Sliding surfaces to be fine machined, all others rough mach

Part 1



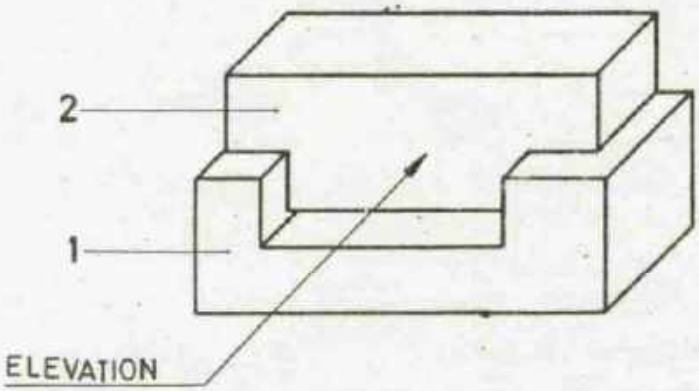
Part 2



Part 1

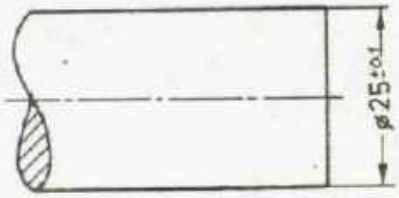
Part 2

w the assembled prismatic guide way in three views.
ı ensions to be taken from sheet No. 21.



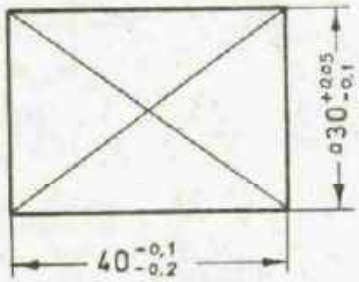
Tolerances

Basic definitions

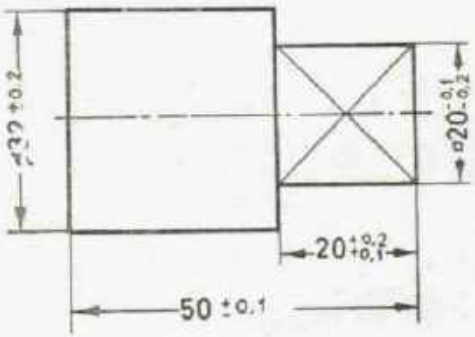


Nominal size:	ø 25.0 mm
Maximum size:	ø 25.1 mm
Minimum size:	ø 24.9 mm
Upper off-size:	+ 0.1 mm
Lower off-size:	- 0.1 mm
Tolerance:	0.2 mm

Nominal size:	30.00	40.0
Max. size:	30.05	39.9
Min. size:	29.90	39.8
Upper off-s.:	+0.05	-0.1
Lower off-s.:	-0.10	-0.2
Tolerance:	0.15	0.1



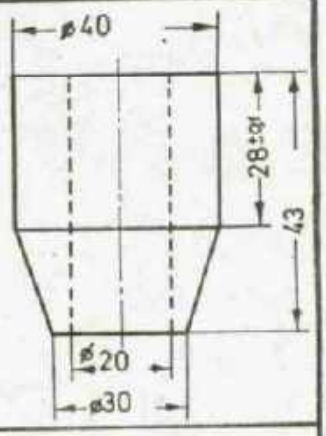
Fill in the blanks!



Nominal s.: Ø 32	□20	50	20
Max. s.:			
Min. s.:			
Upper o.s.:			
Lower o.s.:			
Tolerance:			

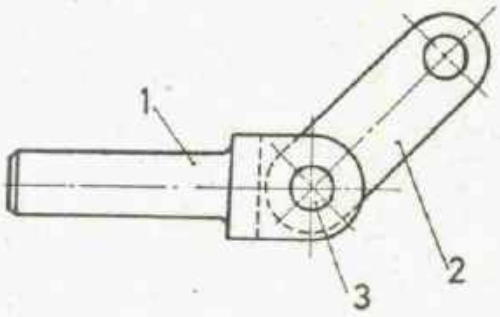
Fill in the off-sizes!

Nominal s.: ø 40.00	ø 30.00	ø 20.00	43.0
Max.s.: ø 40.10	ø 30.05	ø 20.15	43.1
Min.s.: ø 39.95	ø 30.00	ø 19.95	42.9
Upper o.s.: +0.10	+0.05	+0.15	+0.1
Lower o.s.: -0.05	0.00	+0.05	-0.1
Tolerance: 0.15	0.05	0.20	0.2



Exercise: Go back to drawing on top of sheet No.21.
The off-sizes are $^{-0.025}_{-0.05}$ and $^{+0.025}_{0}$.
Which pair of off-sizes belongs to which of the two parts? Fill in!

Assembly of three parts



Item	Description
1	Fork
2	Lever
3	Pin

To get this workpiece properly functioning, the following sizes are to be maintained:

Fork

Nominal size	ø10	12
Maximum size	ø10.10	12.2
Minimum size	ø10.05	12.1

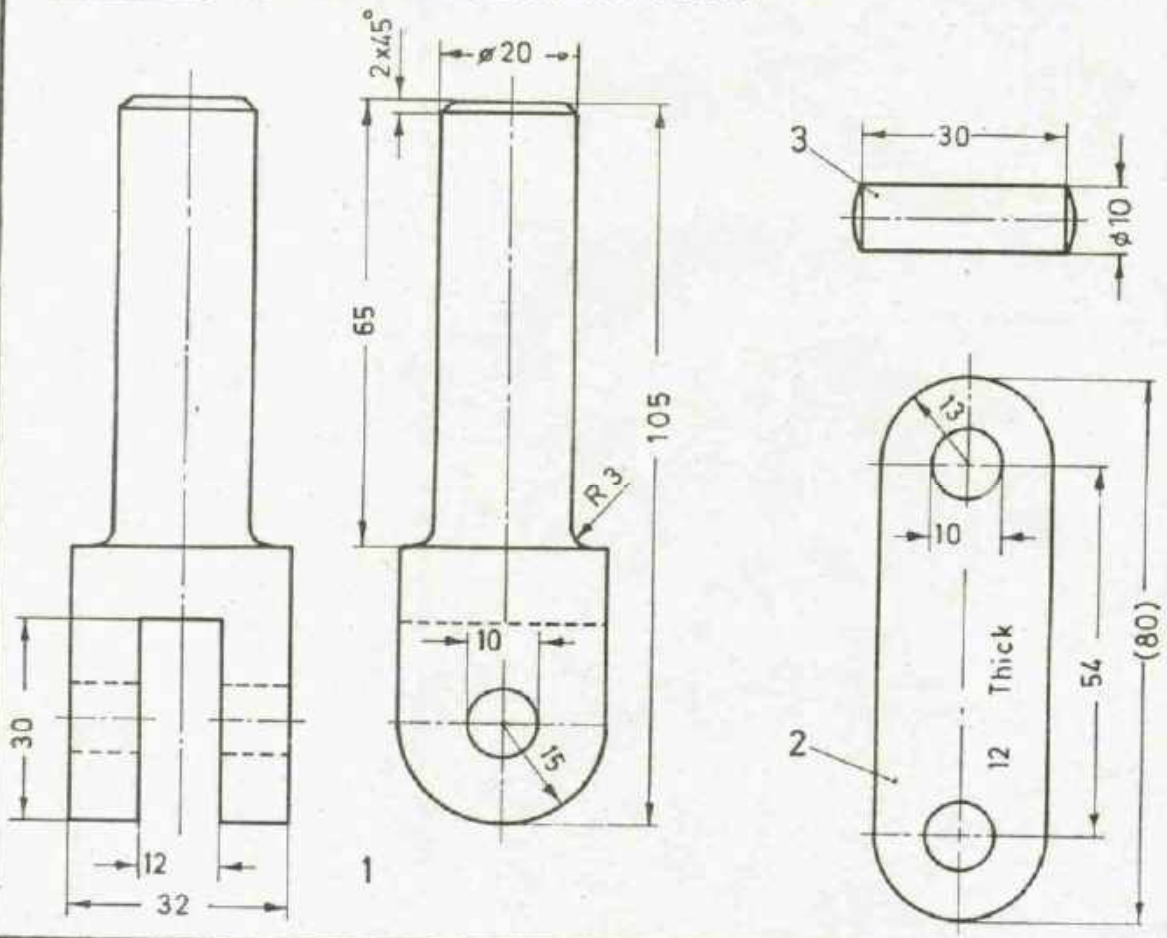
Lever

Nominal size	ø10	12
Maximum size	ø 9.95	12.0
Minimum size	ø 9.90	11.9

Pin

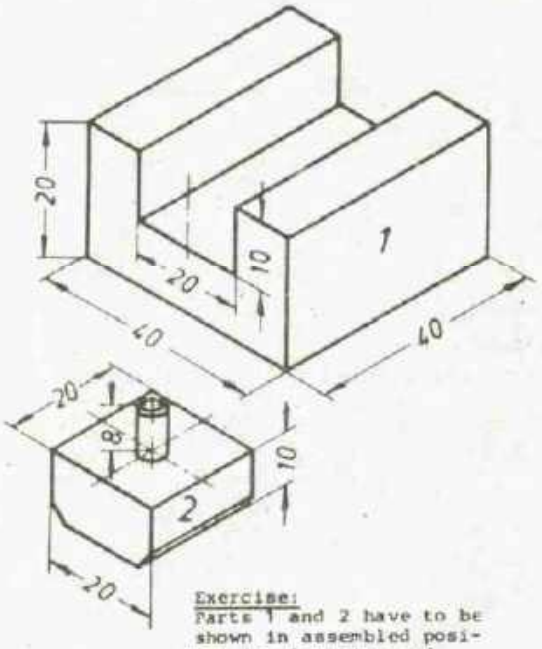
Nominal size	ø10
Maximum size	ø10.05
Minimum size	ø 9.95

Exercise: Fill in the correct off-sizes!

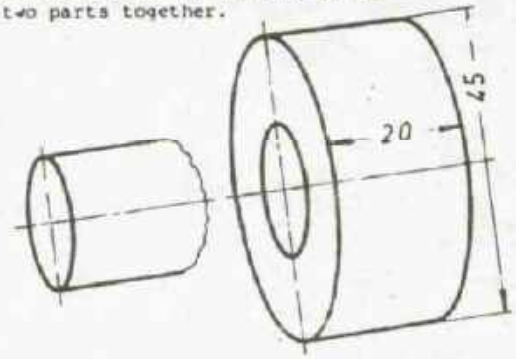


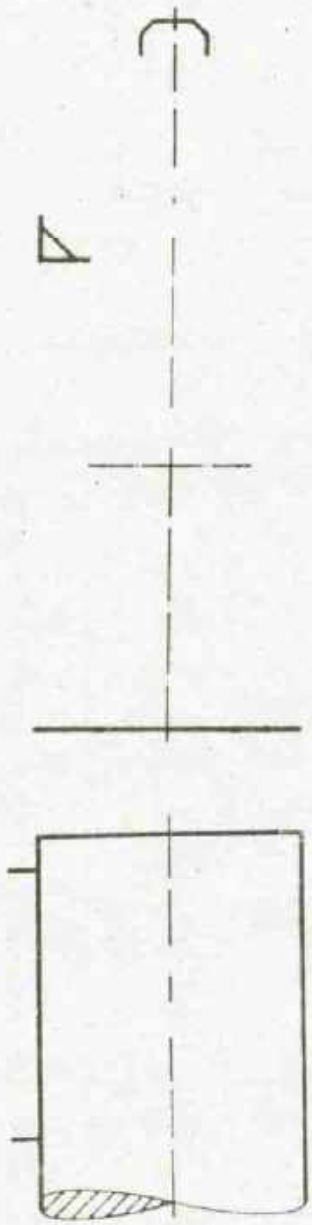
FITS & TOLERANCES (II)

Exercise: Calculate the offsizes from the given maximum and minimum sizes and enter them together with the nominal sizes (40)!



Exercise:
Parts 1 and 2 have to be shown in assembled position in elevation and plan view (scale 2:1).
The width of the guide of part 1 has the offsizes + 0.3 and + 0.1. The respective offsizes of part 2 are 0 and - 0.2. The fit has to be entered for the two parts together.

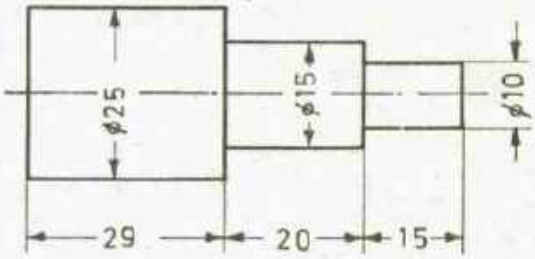




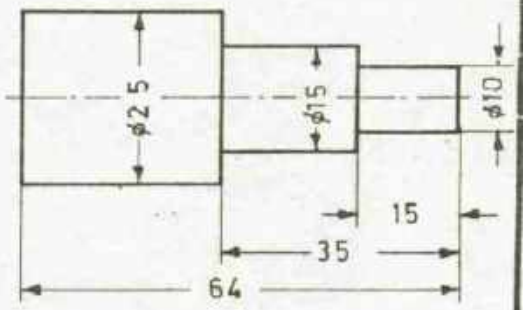
Shaft: max. size 20.00
min. size 19.80
Hole: min. size 20.00
max. size 20.15

Exercise: The two parts have to be shown assembled with the respective offsizes (scale 2:1)!

REFERENCE FACES



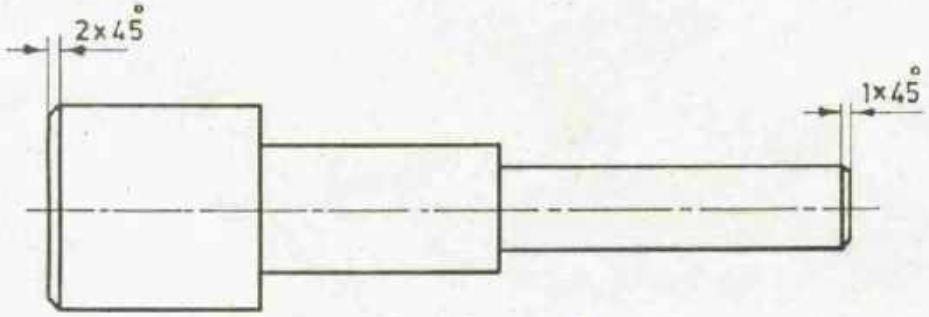
No reference face considered.



Reference face considered.

Sequence of Operation

1. Face one side and drill a centre.
2. Face other side and drill a centre. → length 64 mm required
3. Clamp between centres.
4. Turn Ø 25, length approx. 40 mm.
5. Reclamp in reversed position.
6. Turn Ø 15 → length 35 mm required
7. Turn Ø 10 → length 15 mm required



Exercise

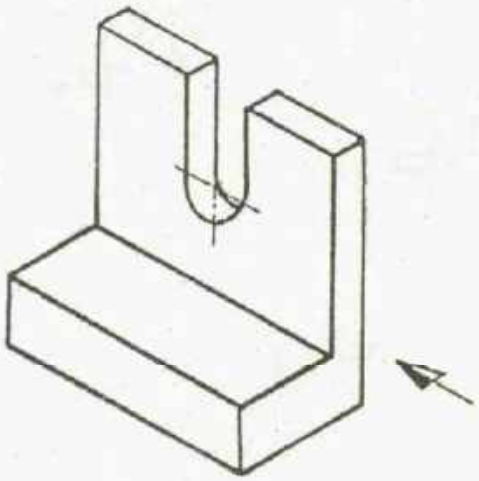
Dimension the above bolt. Consider the reference face according to the necessary sequence of operation.

Sizes: Big dia 30 mm, length 35 mm, dia tolerance ± 0.1 smooth machined

Medium dia 18 mm, length 35 mm, dia tolerance $^{+\ 0.02}_{-\ 0.03}$ fine machined

Small dia 10 mm, length 50 mm, dia tolerance $^{+\ 0.02}_{-\ 0.01}$ fine machined

Drawing from models



Exercise:

Draw the ANGLE SUPPORT in three full scale views.

Enter all necessary dimensions and surface symbols.

Measurements to be taken from the model.

Consider reference surfaces when dimensioning.

Exercise:

Draw the ANGLE SUPPORT in three full scale views.

Enter all necessary dimensions and surface symbols.

Measurements to be taken from the model.

Consider reference surfaces when dimensioning.

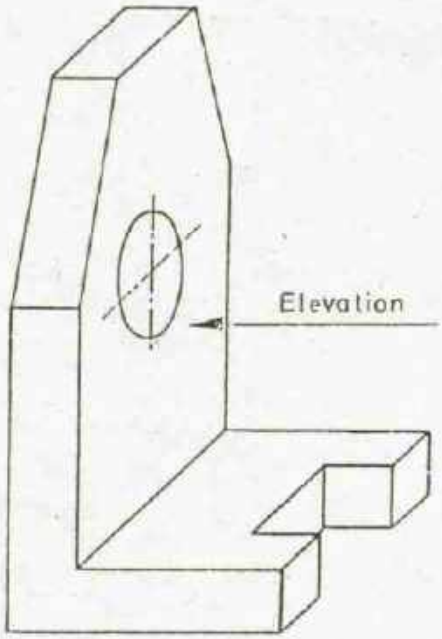
Tolerances:

distance base – centre of hole $^{+\ 0.1}_{\ 0}$

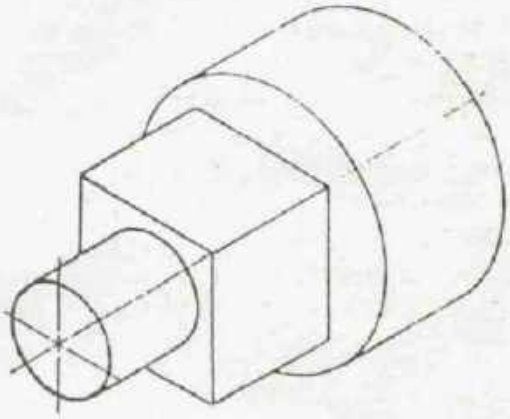
hole dia $\pm$ 0.05

width of recess $^{+\ 0.2}_{+\ 0.1}$

depth of recess $\pm$ 0.2



Drawing from Models



Exercise:

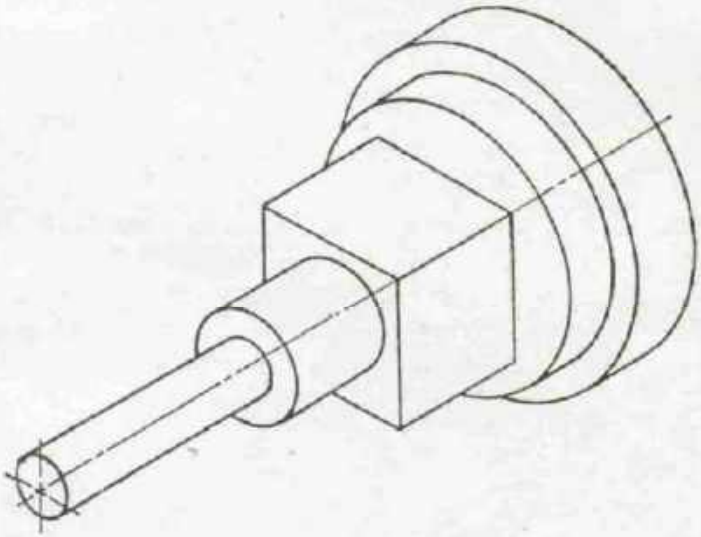
Draw the workpiece in one full scale view.

Enter all necessary dimensions and surface symbols.

Consider reference surfaces in accordance with the likely sequence of turning operations.

Tolerances:

Across flat size of	0
Square	-0.1
All dias	±0.05



Exercise:

Draw the STEPPED BOLT in one full scale view.

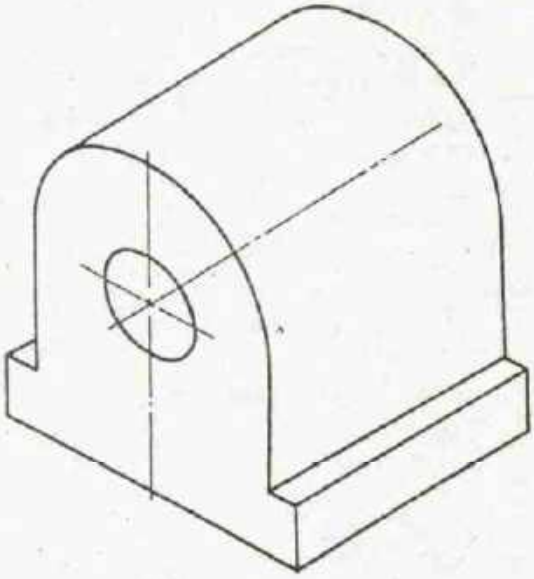
Enter all necessary dimensions and surface symbols

Consider reference surfaces in accordance with the likely sequence of turning operations.

Tolerances:

Across flat size of	0
Square	-0.1
All dias	±0.05

Drawing from Models



Exercise:

Draw the BRACKET in three full scale views.

Enter all necessary dimensions and surface symbols.

Measurements to be taken from the model.

Consider reference surfaces in accordance with the actual machining process when dimensioning.

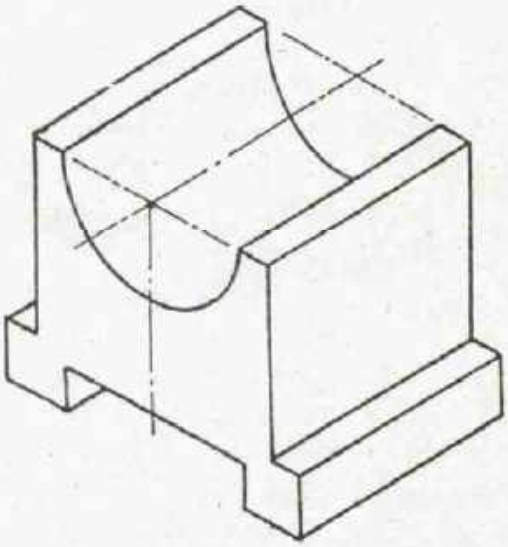
Tolerances:

bore dia $^{+0.05}_{0}$

distance of base to centre of bore ± 0.1

total length $^{0}_{-0.1}$

length of the bored portion. ± 0.1



Exercise:

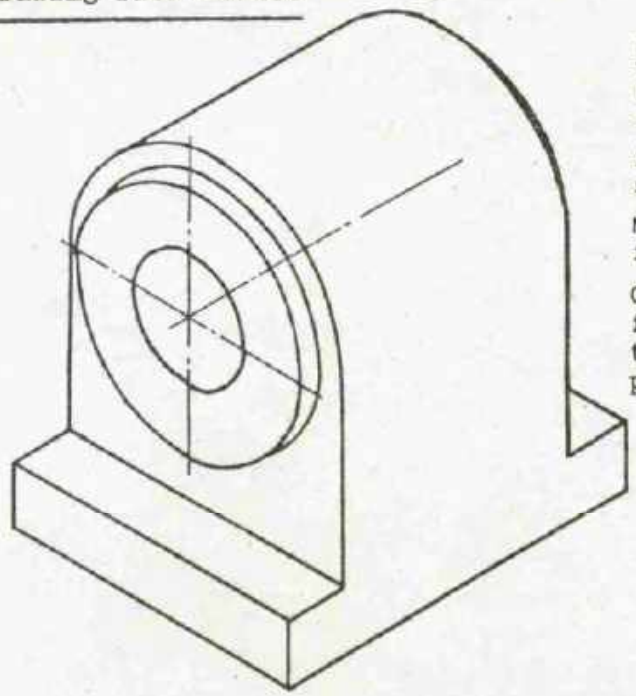
Draw the BEARING BLOCK in three full scale views.

Enter all necessary dimensions and surface symbols.

Measurements to be taken from the model.

Consider reference surfaces in accordance with the actual machining process when dimensioning.

Drawing from Models



Exercise:

Draw the PLUMMER BLOCK in three full scale views.

Enter all necessary dimensions and surface symbols.

Measurements to be taken from the model.

Consider reference surfaces in accordance with the actual machining process when dimensioning.

Tolerances:

bore dia $^{+0.05}_{0}$

distance of base to centre of bore ± 0.1

total length $^{0}_{-0.1}$

length of the bored portion ± 0.1

Exercise:

Draw the LEVER in two full scale views.

Enter all necessary dimensions and surface symbols.

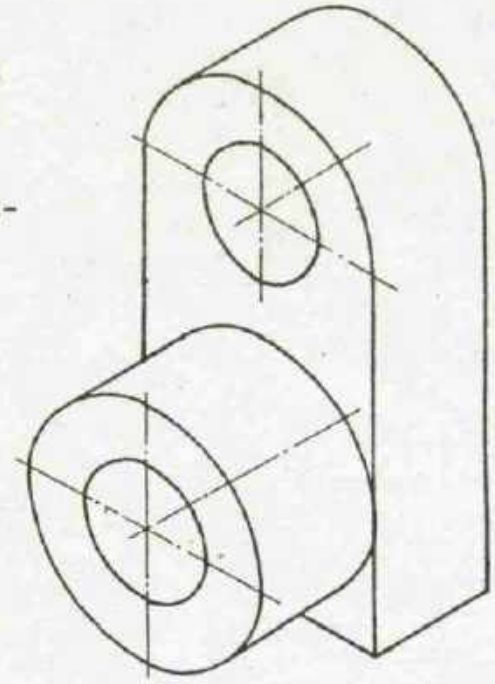
Measurements to be taken from the model.

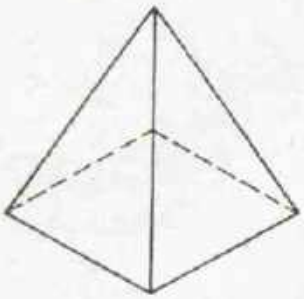
Consider reference lines in accordance with the likely sequence of machining when dimensioning.

Tolerances:

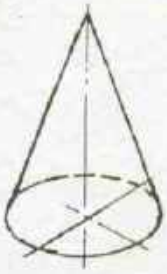
centre distance ± 0.1

internal dias $^{+0.05}_{0}$

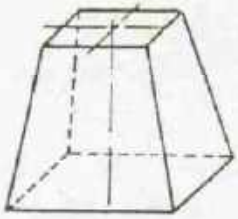




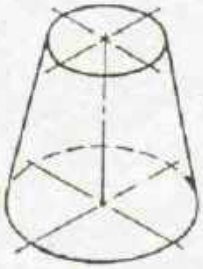
Pyramid



Cone

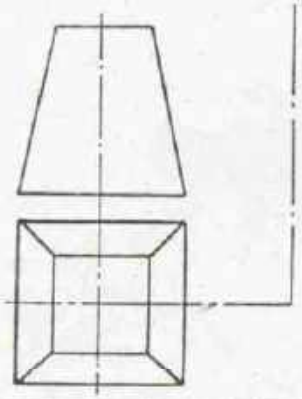


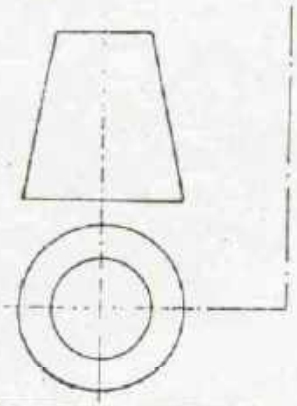
Frustun of Pyramid

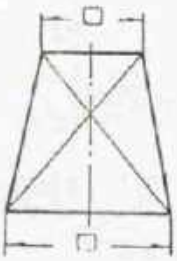


Frustum of cone

Exercise: Draw the side views.

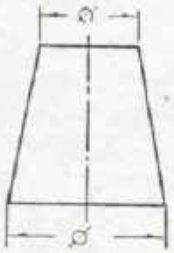


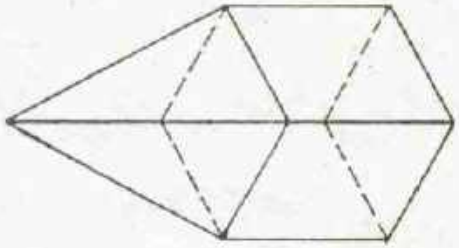


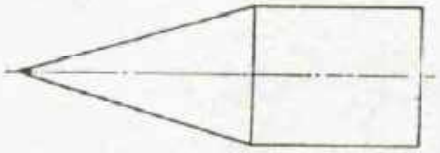


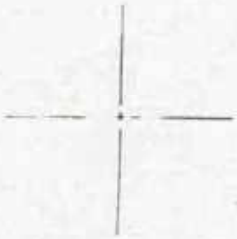
Note: Only one view is required when the symbols for dia or square are given.

Workpieces with square cross section are drawn with two additional diagonal lines.

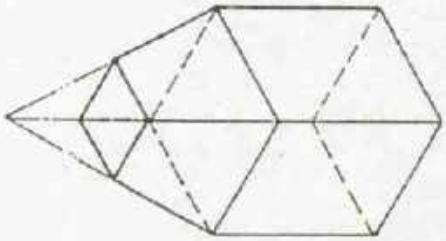


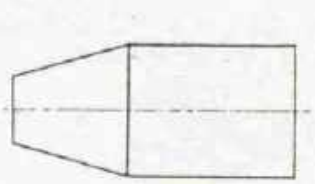


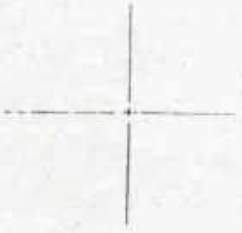




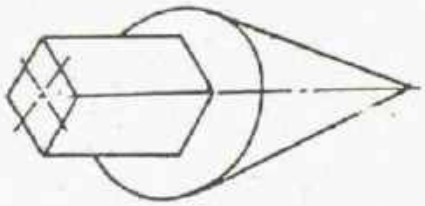
Exercise: Draw the side view.

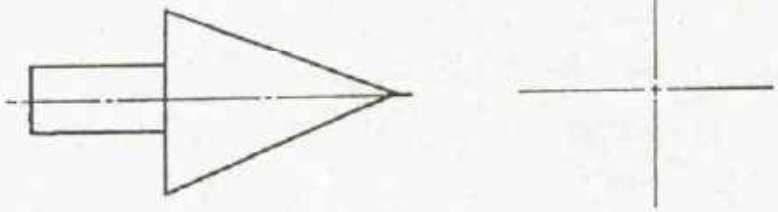




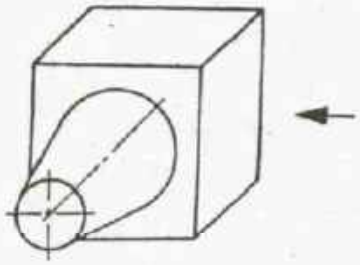


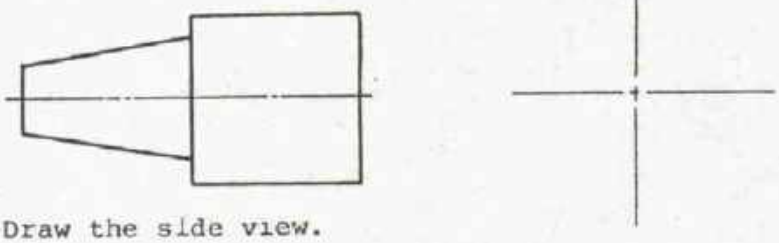
Exercise: Draw the side view.



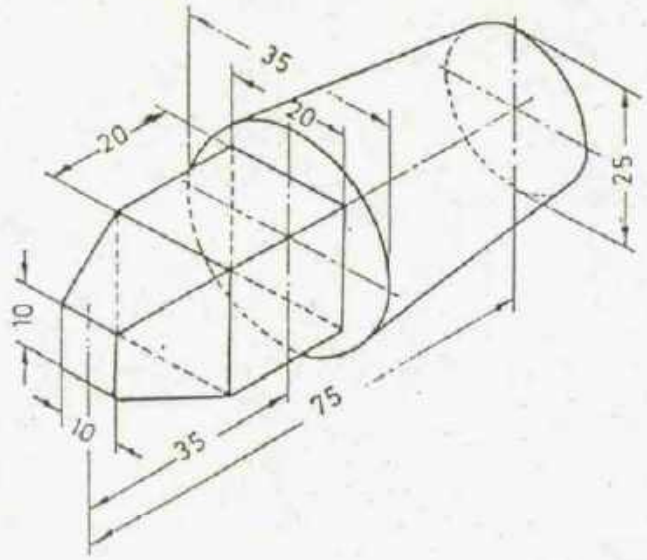


Exercise: Draw the side view.



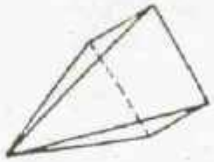


Exercise: Draw the side view.

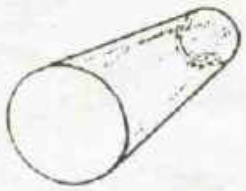


Exercise: Draw the workpiece with all necessary dimensions.

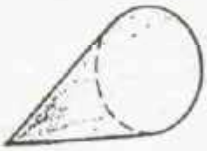
Home Assignment No. 5



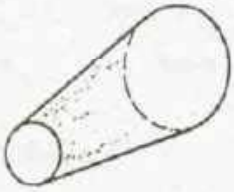
Ⓐ



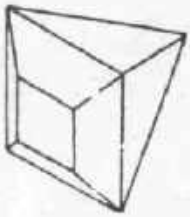
Ⓑ



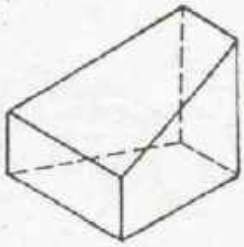
Ⓒ



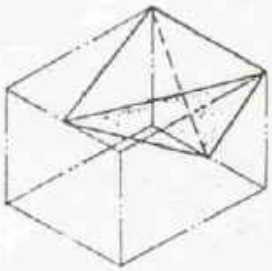
Ⓓ



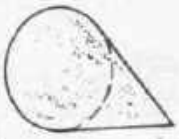
Ⓔ



Ⓕ



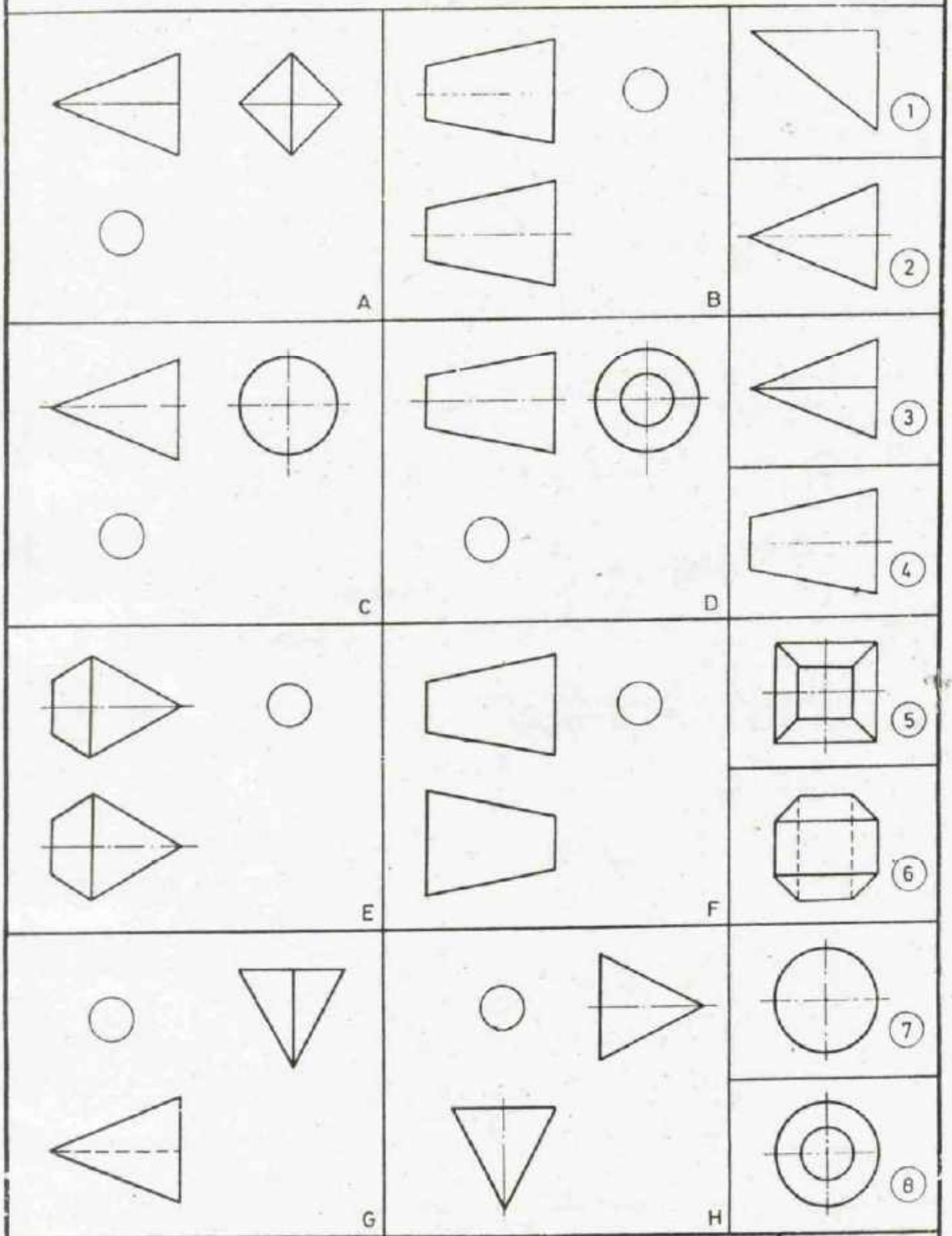
Ⓖ



Ⓗ

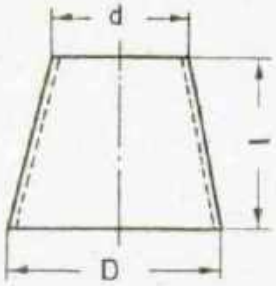
Pictorial Views

Allocate the views 1 - 8 to the corresponding drawings.
Enter their numbers in the circles concerned.



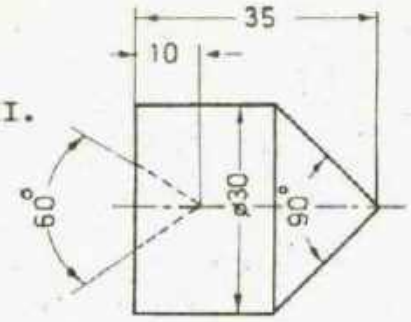
Dimensioning of Cones

I.



Conical workpiece made out of sheet metal.

II.



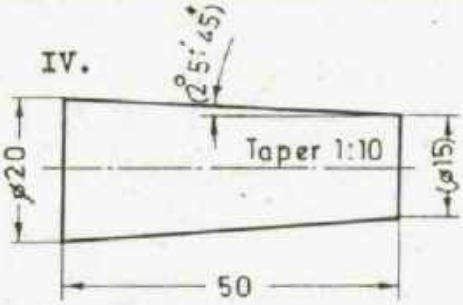
Cone with a simple cone angle α that can easily be measured (e.g. 30°, 45°, 60°)

III.

Taper 1 : x = $\frac{D - d}{l}$

All other types of cones are dimensioned by using the TAPER RATIO in addition to length, large dia, small dia

IV.



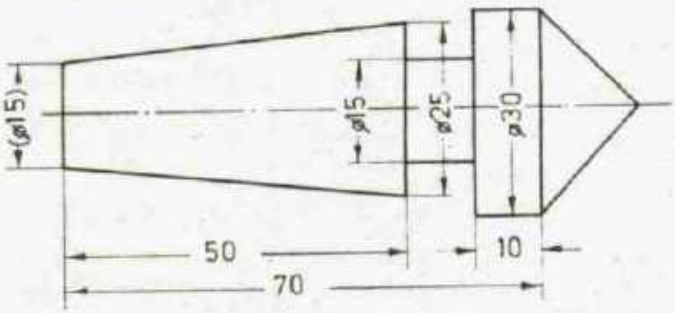
If the cone is to be produced on a lathe the SETTING ANGLE is to be added.

SETTING ANGLE = half CONE ANGLE

Standardized taper ratios and the corresponding setting angles are.

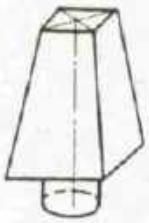
Taper ratio	1 : 50	1 : 20	1 : 10	1 : 6	1 : 5
Setting angle	34'23"	1°26'	2°51'45"	4°51'45"	5°42'38"

Exercise: Enter cone angle, taper ratio, setting angle.



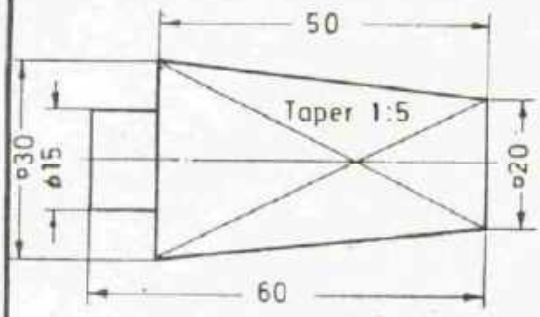
Exercise: Enter the missing taper dimensions on bottom of sheet 29

Pyramidal Workpieces - Dimensioning -



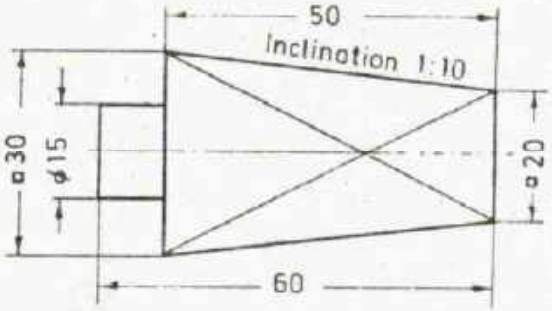
There are two possibilities of dimensioning pyramidal workpieces:

I. TAPER RATIO is entered



Note: The definition of the taper ratio for pyramidal workpieces is the same as that for cones.

II. INCLINATION is given

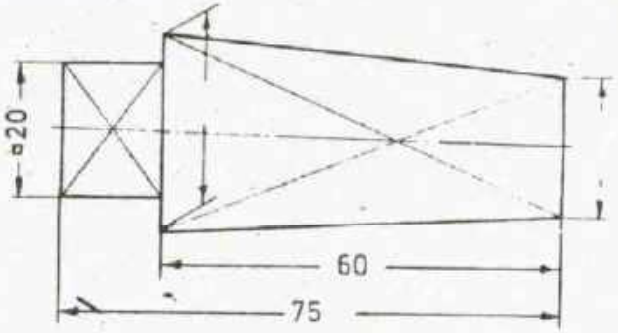


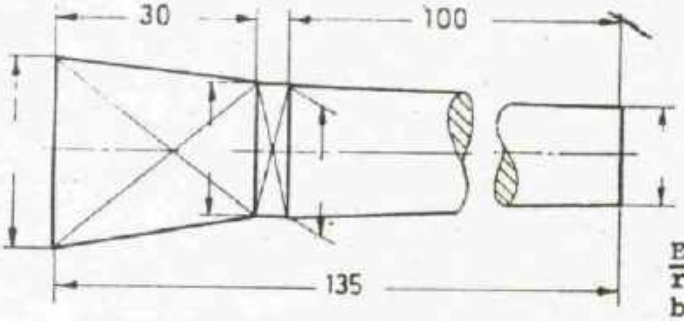
Note: The inclination refers to one edge only.

It has half the value of the taper ratio.

Exercise: Enter the missing dimensions.

Enter TAPER RATIO ⟹

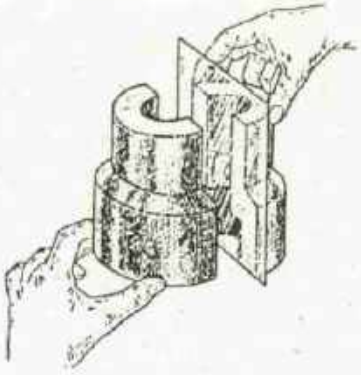


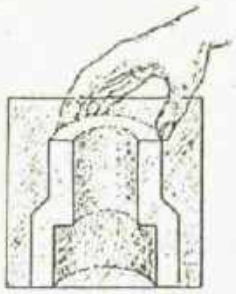


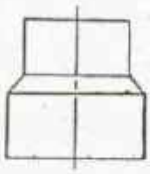
⟸ Enter INCLINATION (for the pyramid)

Exercise: Enter the taper-ratio of the pyramid on bottom of sheet no. 29 !

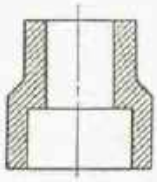
Full section

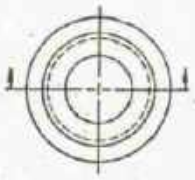




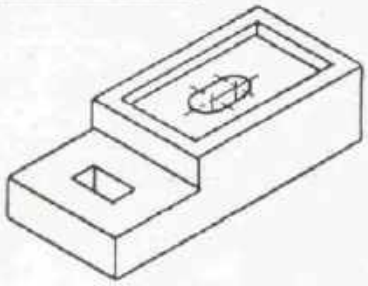


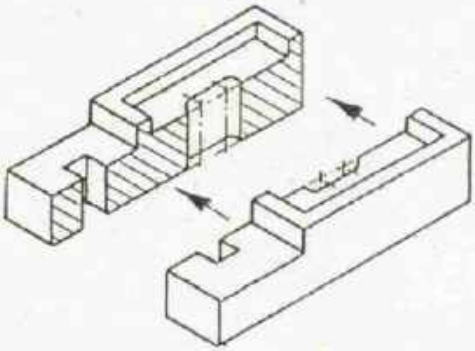
Compare!



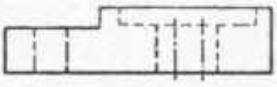


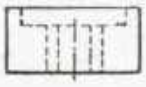
Full Sections

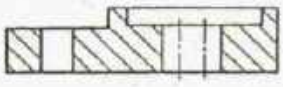


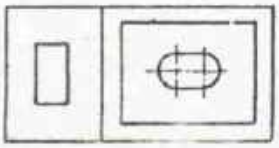


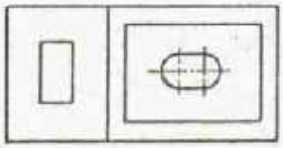
Compare!











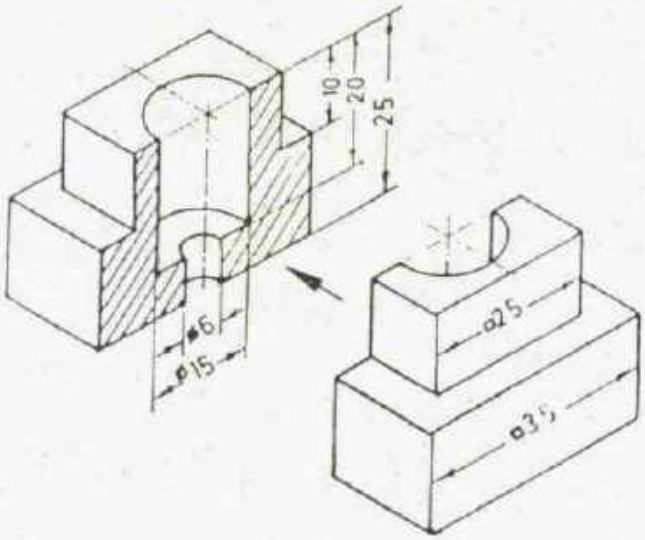
Information Sheet

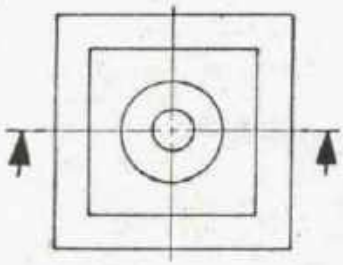
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

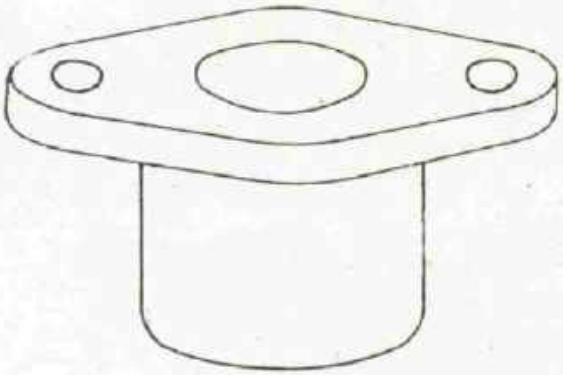
No.33

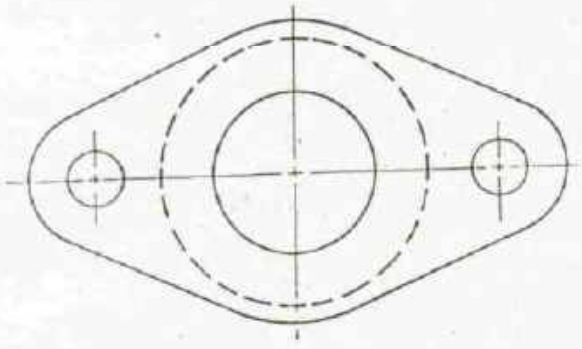




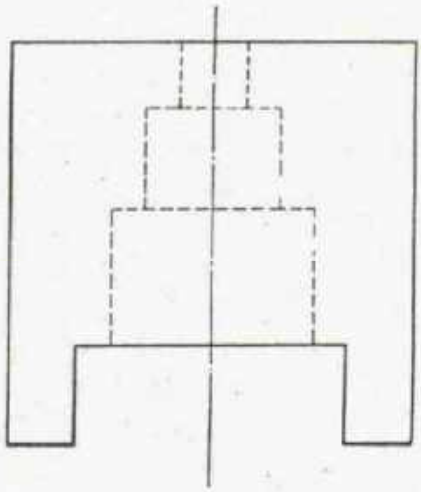
Exercise: Draw the workpiece in full section true to scale.
Enter all necessary dimensions.

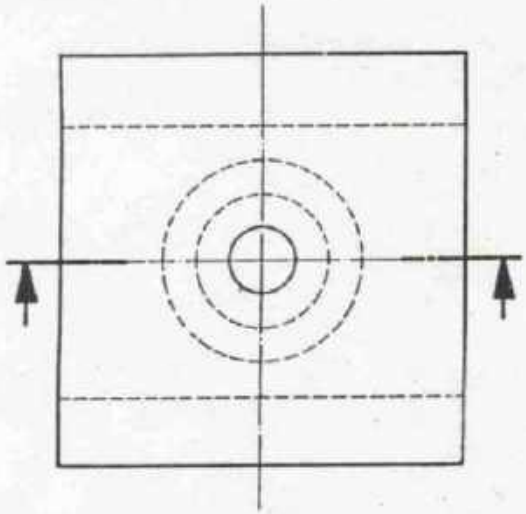
Note. Do not draw invisible lines in sectional views.





Exercise: Draw the workpiece in full section.
Enter all necessary dimensions.
Measurements to be taken from the model.

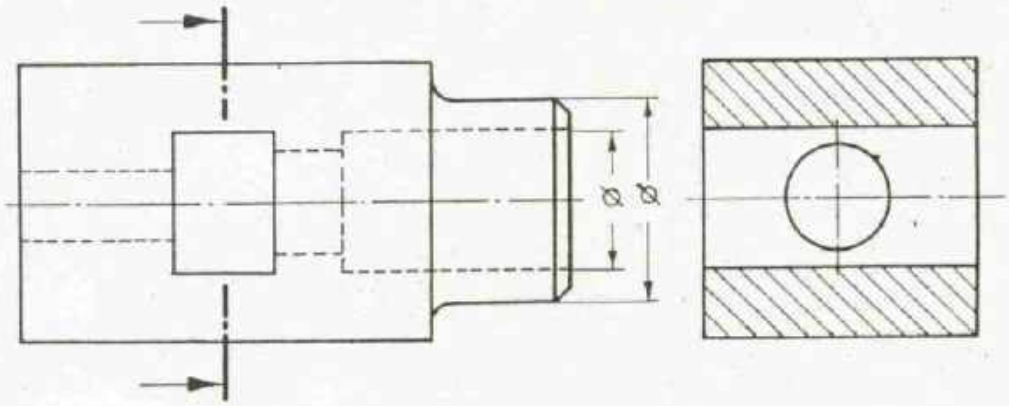




Exercise: Draw the sectional elevation.
Enter all necessary dimensions.

Home Assignment No. 6

Full Sections



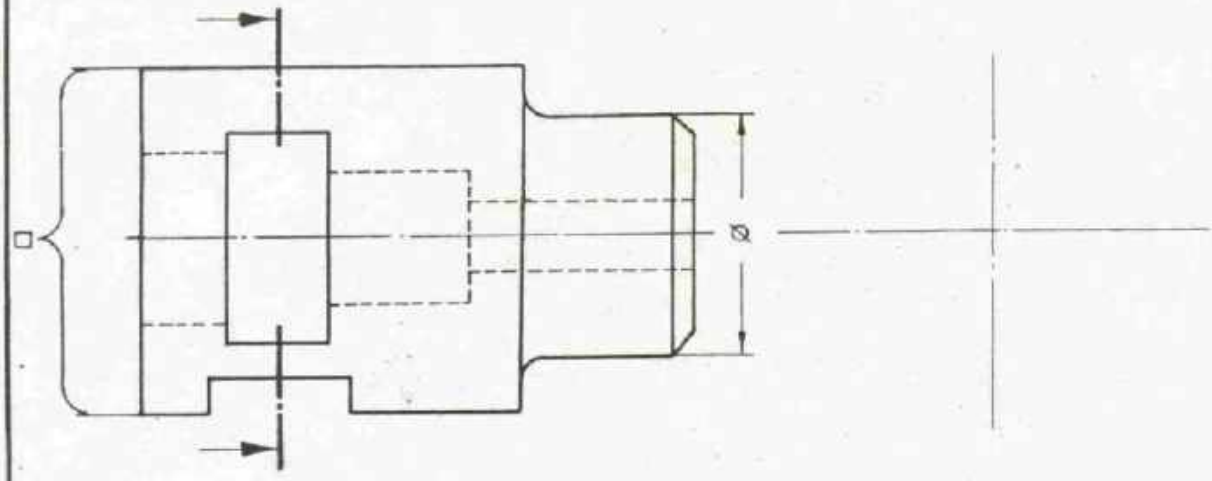
Note:-Where the location of the section plane is not sufficiently clear, it is to be indicated by a thick dash-point line (section plane line).

-The direction of view is shown by arrow heads pointing to the ends of the section plane line.

Exercise:

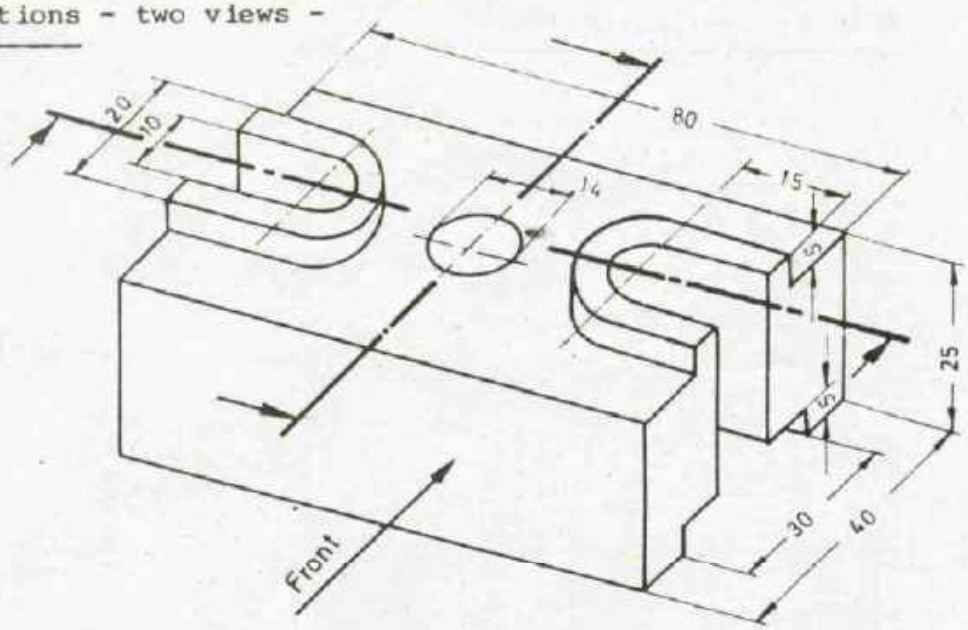
Draw the side view in full section with all necessary dimensions (to be taken from elevation).

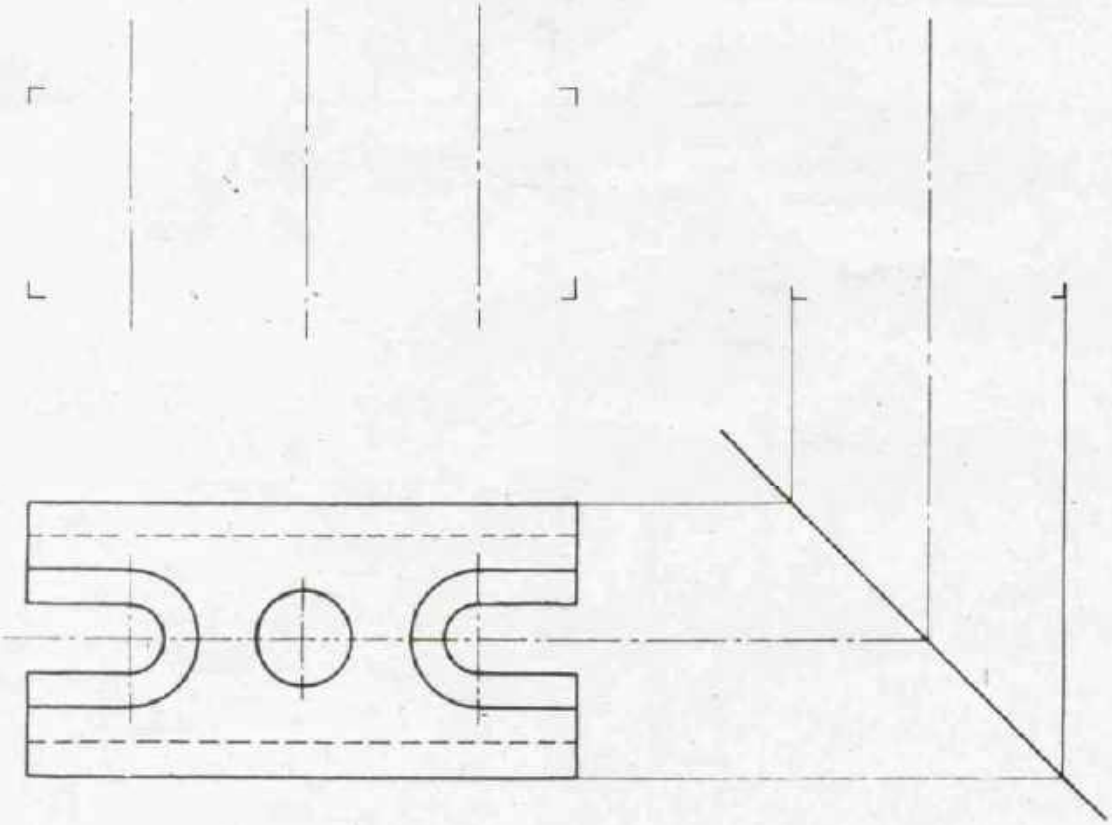
Note: - In exceptions dimensions may be given at invisible lines !



The CONNECTING PIECE shows a cylindrical workpiece with three different bores in axial direction.

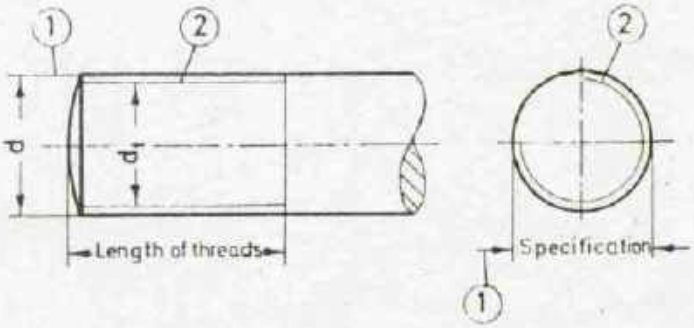
Full sections - two views -

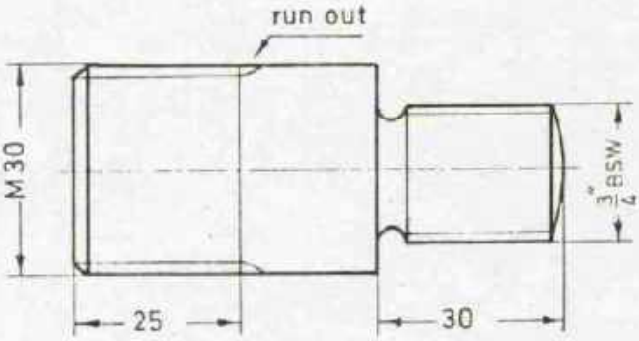




Exercise: Draw elevation and side view as section.
Enter all necessary dimensions.

External (male) Thread





Note:

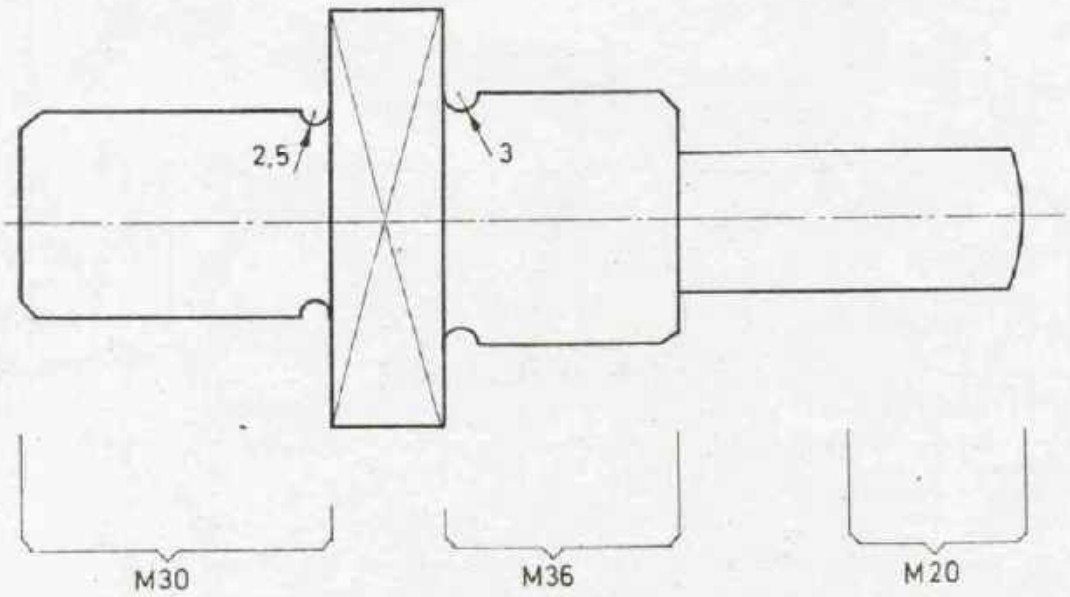
Threads are specified by entering codes (e.g. M 20) or dimensions (e.g. 1/2").

(1): The major dia (d) is used to indicate the thread specification.

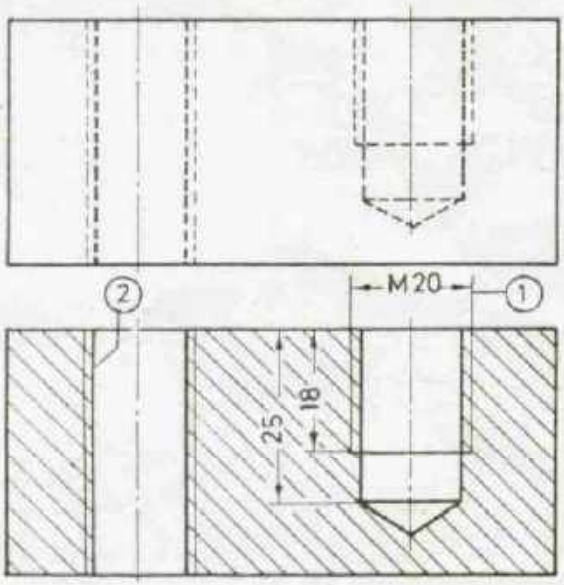
(2): The core dia (d_1) is indicated by a thin full line but not dimensioned.

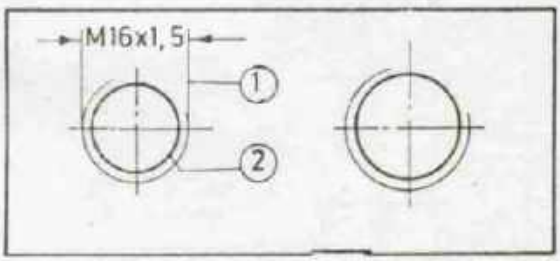
If the tread is looked at in axial direction the minor dia is symbolized by a three quarter circle.

Exercise: Complete the drawing of the bolt and enter all necessary codes and dimensions.



Internal (female) Thread





Note:

① : The major dia is used to indicate the thread specification.

In sections it is drawn in a thin full line.

If the thread is looked at in axial direction the major dia is symbolized by a three quarter circle drawn in a thin full line.

② : The minor dia indicates the hole to be drilled before tapping.

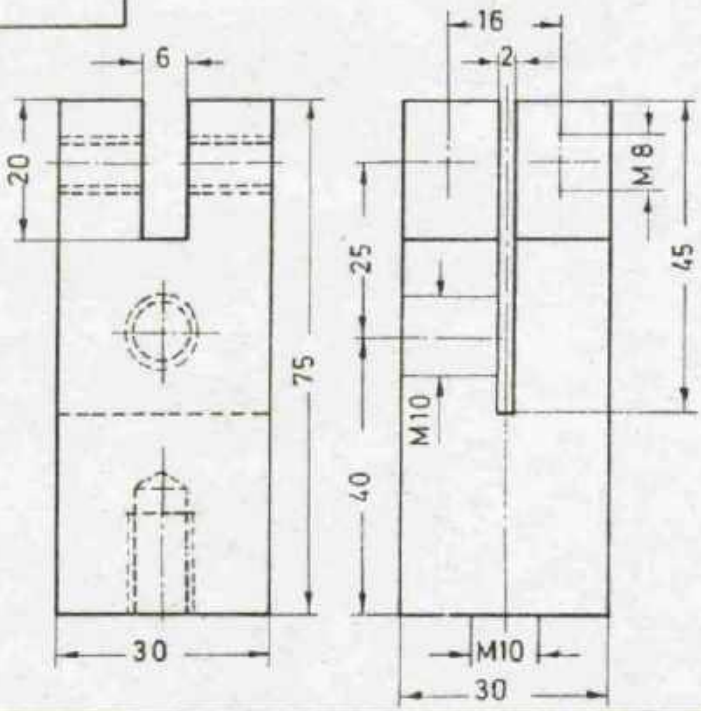
It is drawn but not dimensioned.

Correct minor dias for each thread size may be found in tables.

Exercise:

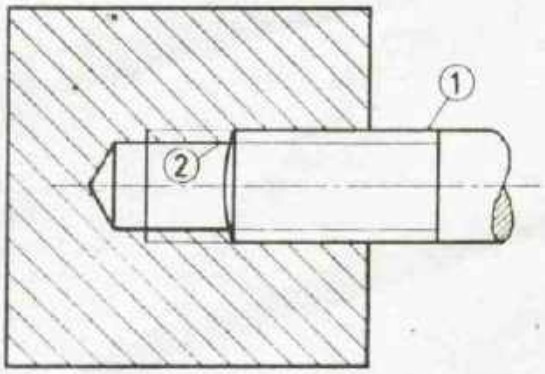
Complete side view in full section.

Mind the correct representation of the threads.

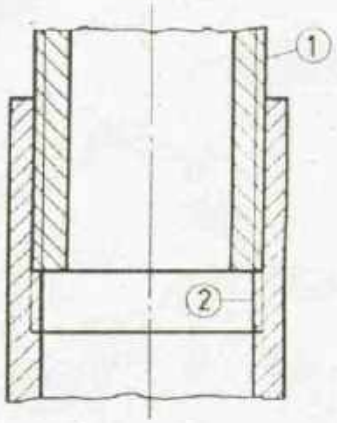


Screw Joints

Stud in tapped hole

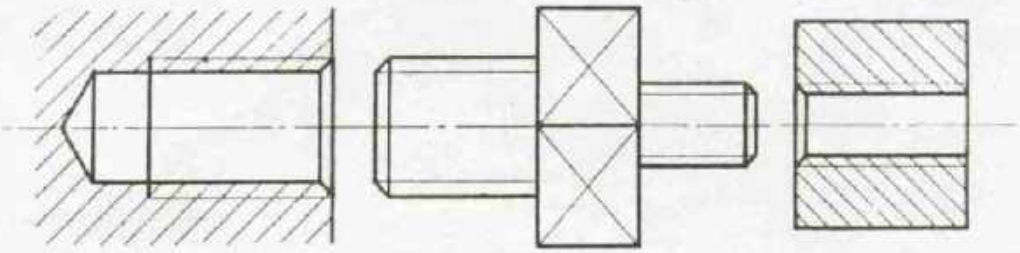


Pipe joint
(pipe in pipe)

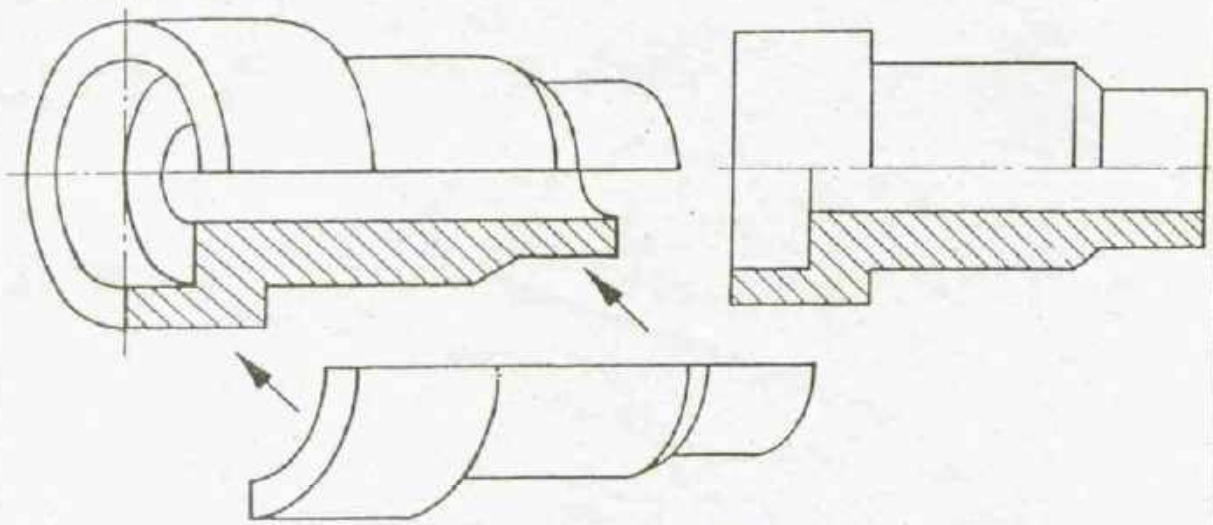


Note: In sectioned assemblies the external thread (1) is shown visible thus it covers the internal one (2).

Exercise: Draw the assembly of parts A-C in full section.



Half Sections

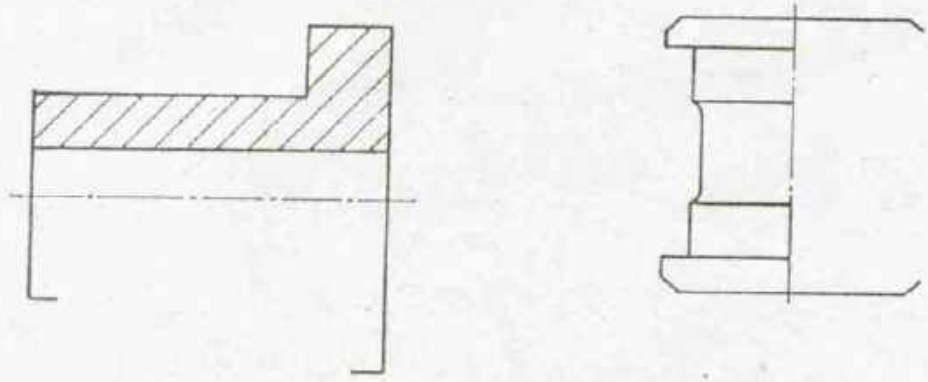


Note:

Workpieces showing rotational symmetry may be represented in half section.

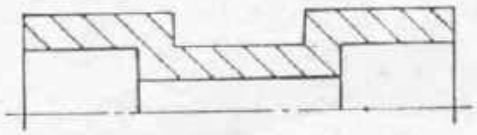
Complete: The main advantage of this kind of representation is

_____

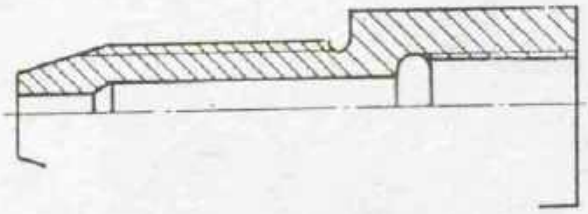


Exercise: Add the missing portion in half section.

Note: Workpieces are rotational symmetric and has a centre bore of Ø 15 mm.



Exercise: Add the missing half view.



Exercise: Add the missing half view.

Home Assignment No. 8

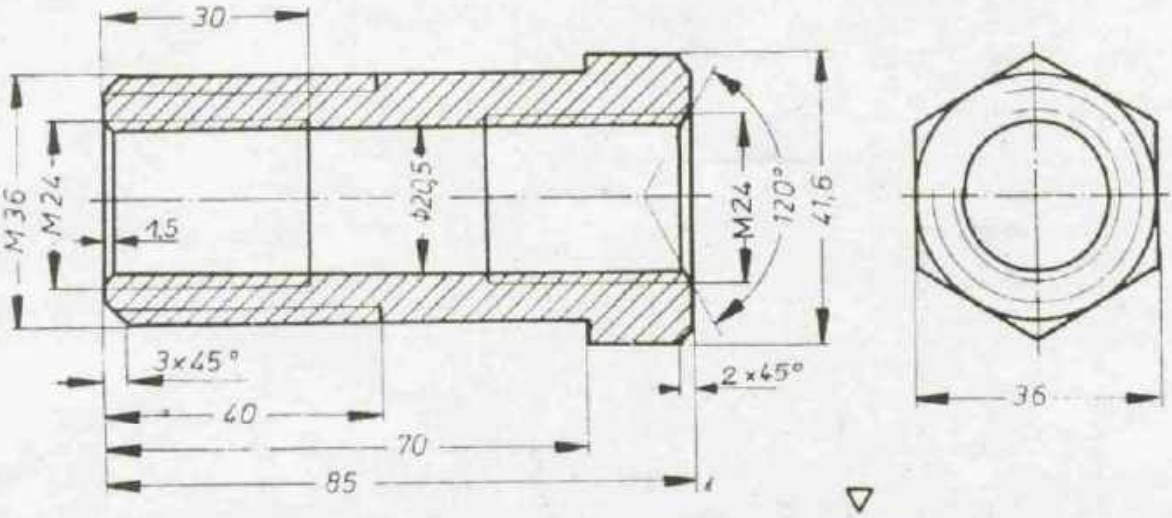
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

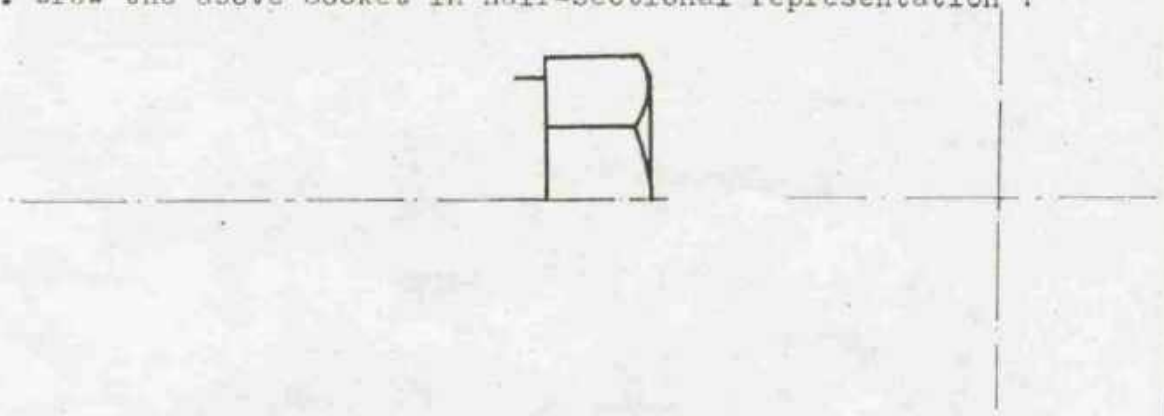
Technical Drawing - No. 39.1

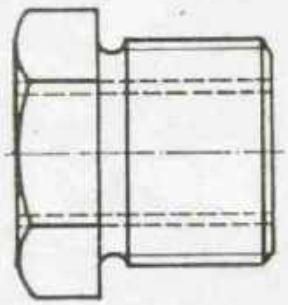
Threads in Half Section

Exercises:

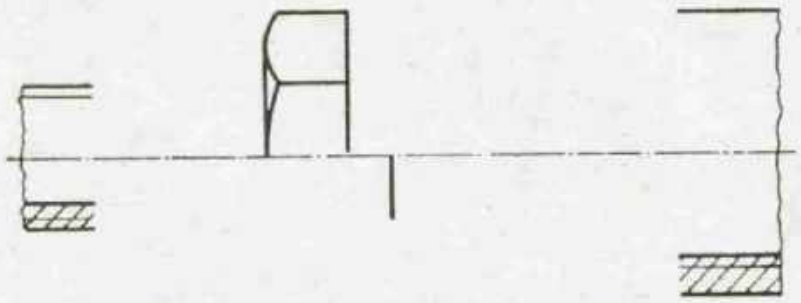


I. Draw the above Socket in half-sectional representation !

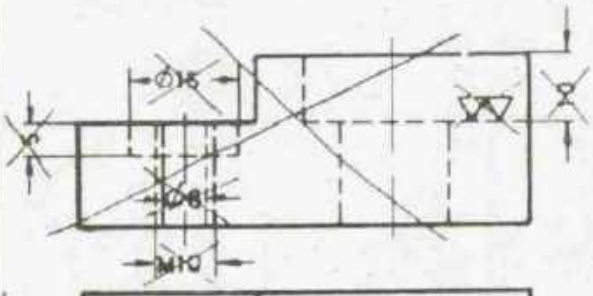


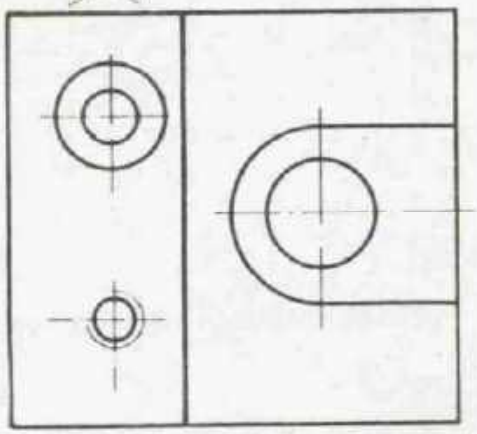


II. A Reducing Socket, external thread R 1", internal thread R 1/2", connects two pipes. Wall thickness of the big pipe is 6mm, of the small pipe 4mm.
Draw the joint in a half- sectional representation. Enter all necessary dimensions in the detail drawing of the socket.



Offset Sections



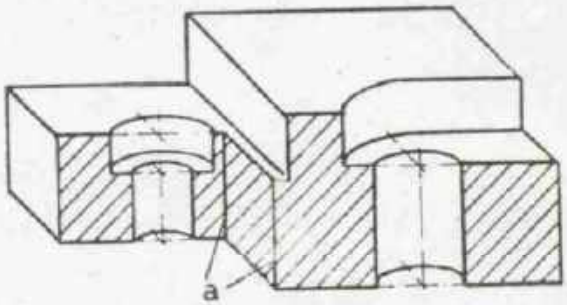


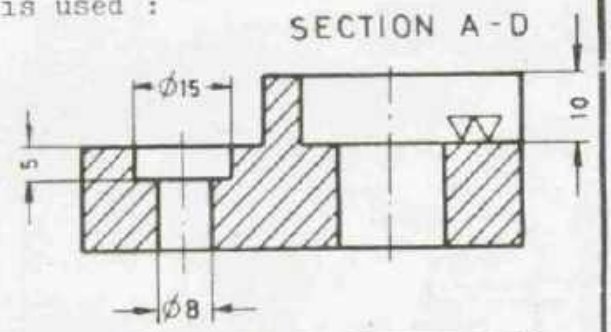
This representation is not suitable as elevation view of the workpiece !

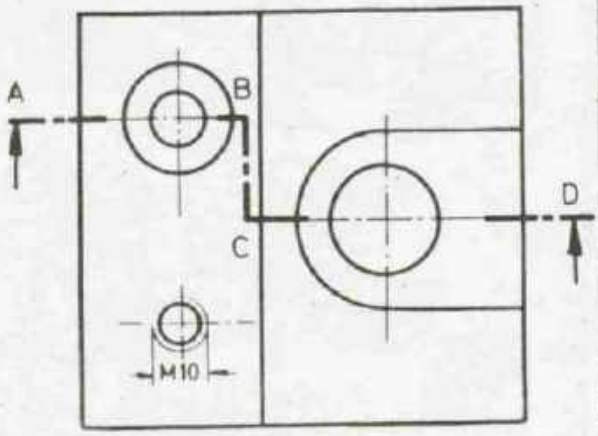
Give r asons:

1. _____
2. _____
3. _____
4. _____
5. _____

To avoid these faults and to lay open as much hollow space as possible the OFFSET SECTION is used :



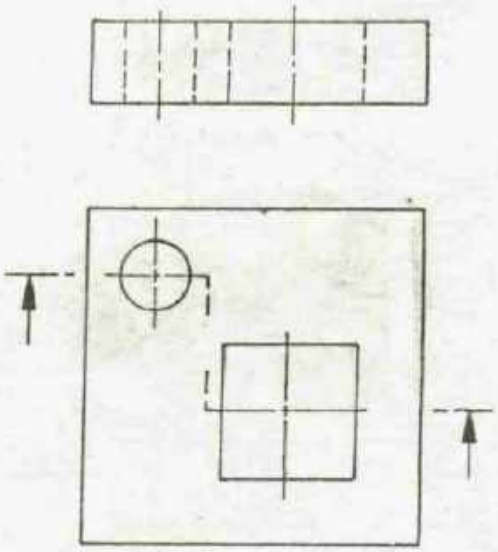




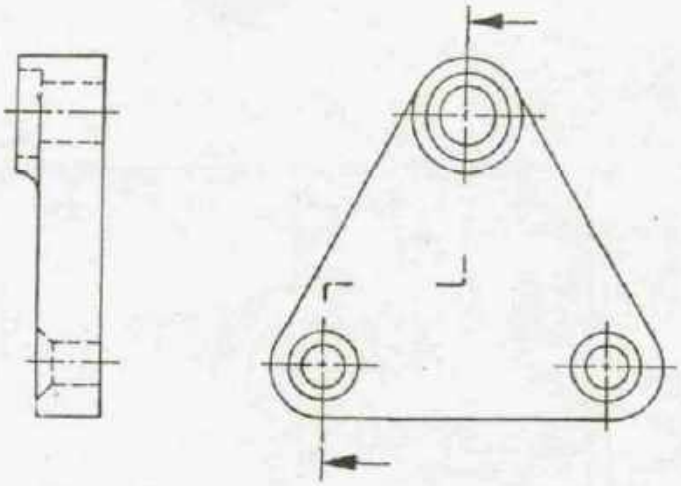
Note:

I. If the cut jumps from one plane to another the course of the cut must be indicated e.g. "SECTION A-D"

II. The offset in the cutting plane (a) does not create a line in the sectional view!



Exercise: Draw the sectional elevation.

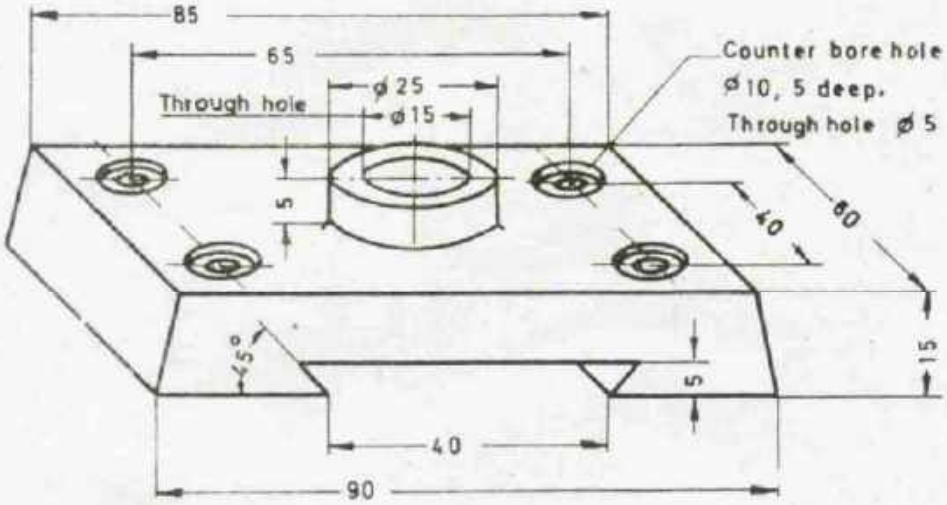


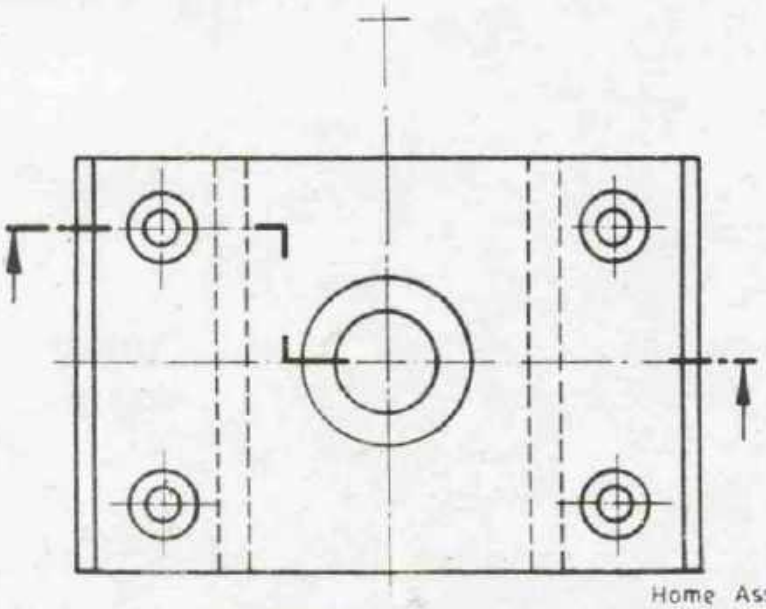
Exercise: Draw the sectional side view.

Offset Sections

Exercise:

Drew the elevation view of the Slide as offset section !





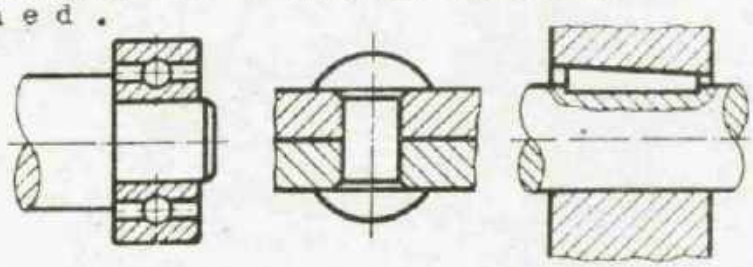
Home Assignment No.9 .

Parts not sectioned

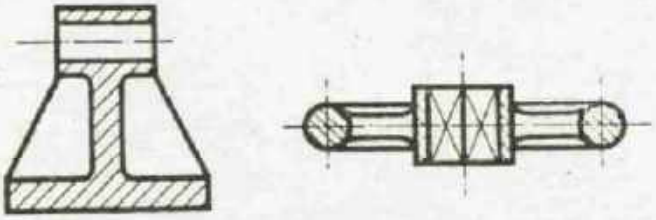
Machine elements and parts which have no internal structure, are n o t s e c t i o n e d .

SOLID PARTS e.g.

Shafts, balls,
rivets,
keys.



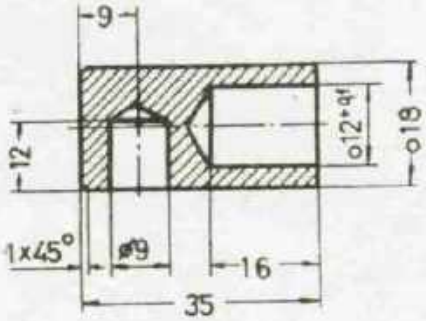
RIBS and SPOKES e.g.

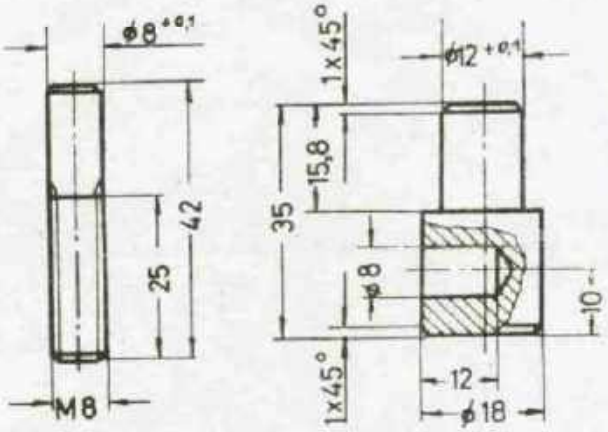


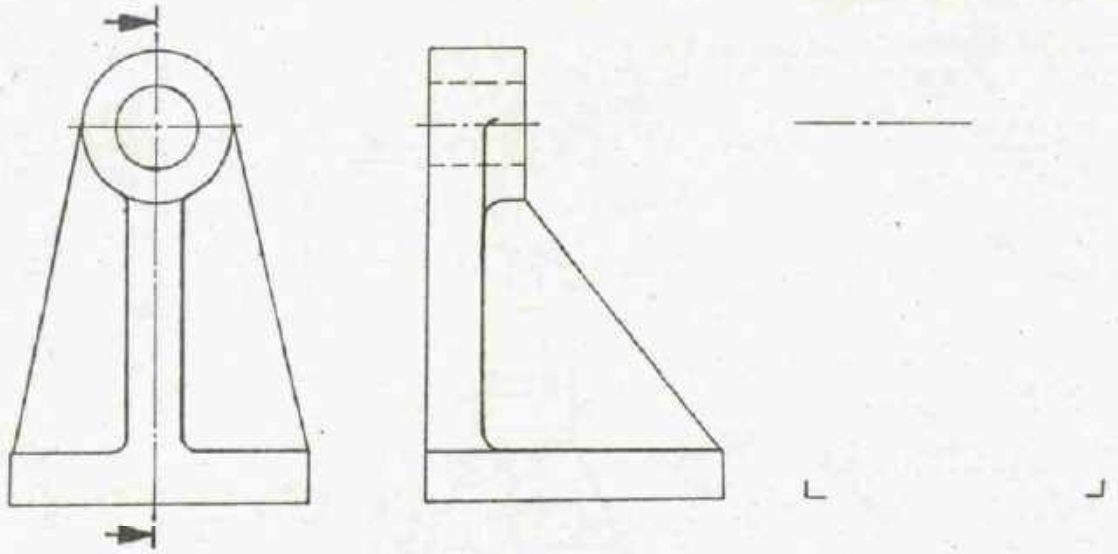
Note: If these parts are shown in cross-sectional view, they a r e sectioned.

Exercise:

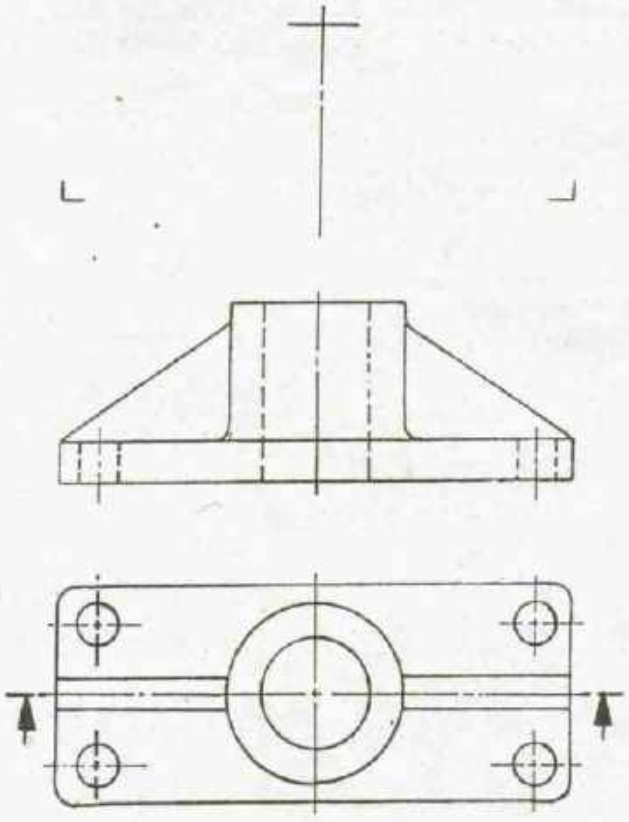
Prepare the assembly drawing of the hinge.
For the bore hole ø 8 use the same type of sectioning as in the detail drawing.



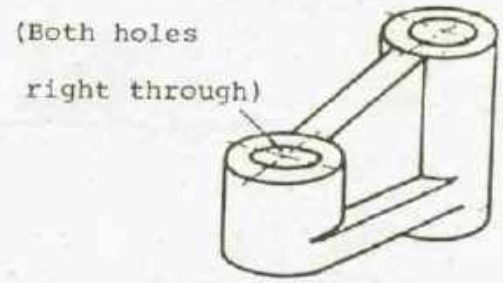


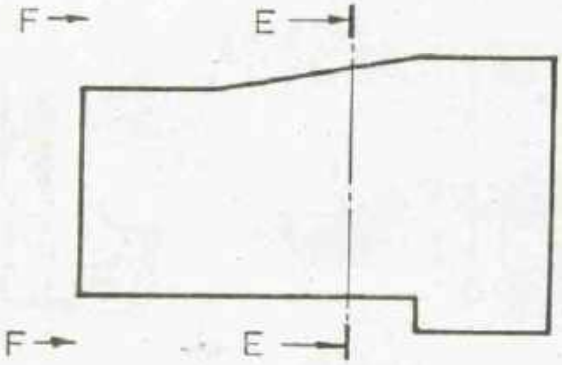


Exercise: Draw the side view in full section.



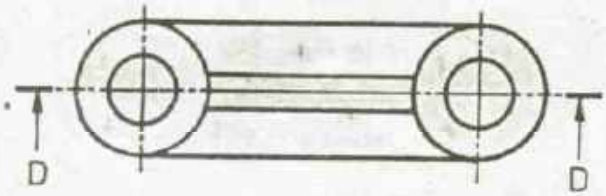
Exercise: Draw the full sectional elevation.





End View

Section E-E



1. Draw an end view looking in the direction of arrows F-F.
2. Complete the sectional front view looking on plane D-D.
3. Complete the sectional end view looking on plane E-E.

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

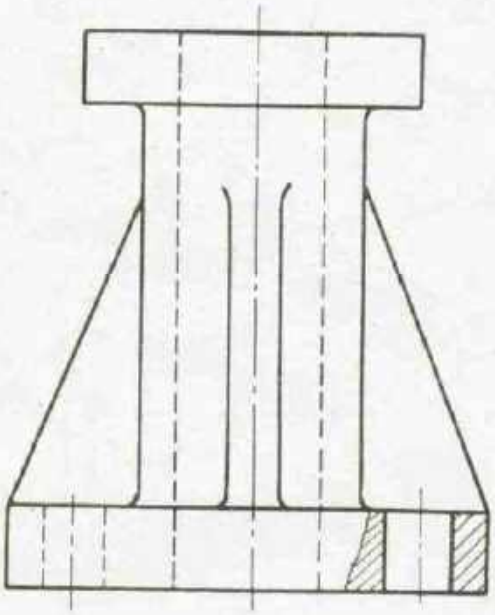
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

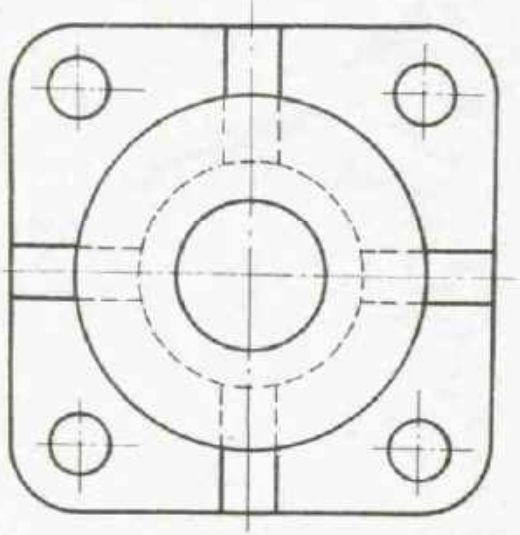
Technical Drawing

No.44.1

Parts not Sectioned

Draw the elevation view of the Spindle Support as full section !

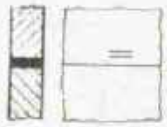
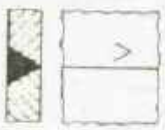
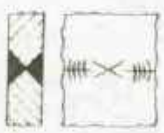
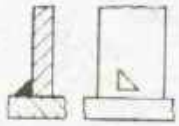
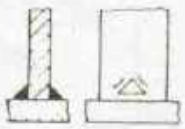
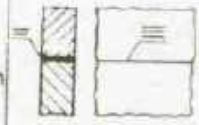
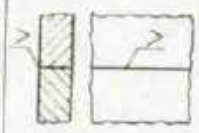
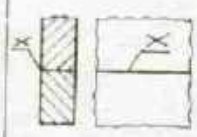
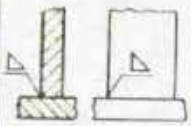
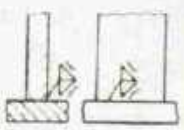




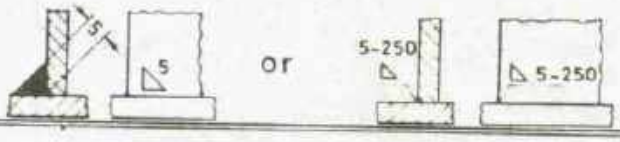
SPINDLE SUPPORT

Scale 1:1

Welding Symbols

	Square Butt-weld	Vee Butt-weld	Double Vee or X-Butt weld	Single fillet	Double fillet (concave)
Pictorial representation					
Symbolic representation					

Example :

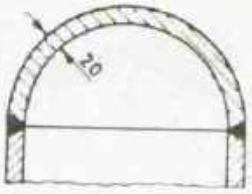


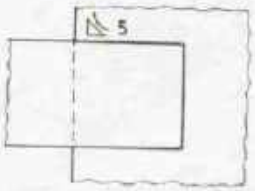
The informations given by these representations are :

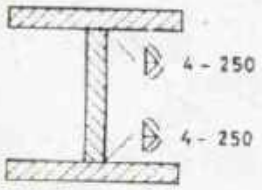
Single fillet
thickness of weld = 5mm
Length of weld = 250mm

Exercises :

I. Find out the type of weld and the thickness :

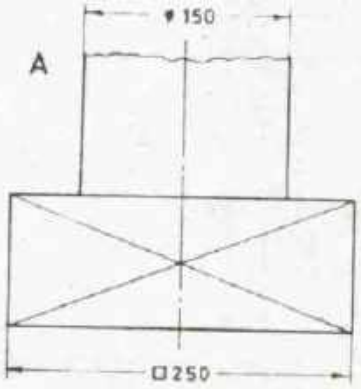




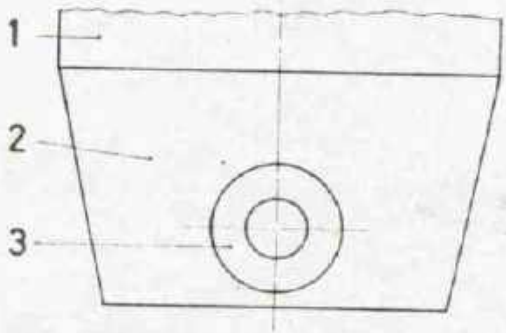


Type of weld _____ _____ _____
Thickness of weld _____ _____ _____

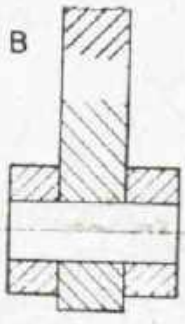
II. Enter the pictorial representation with scale 1



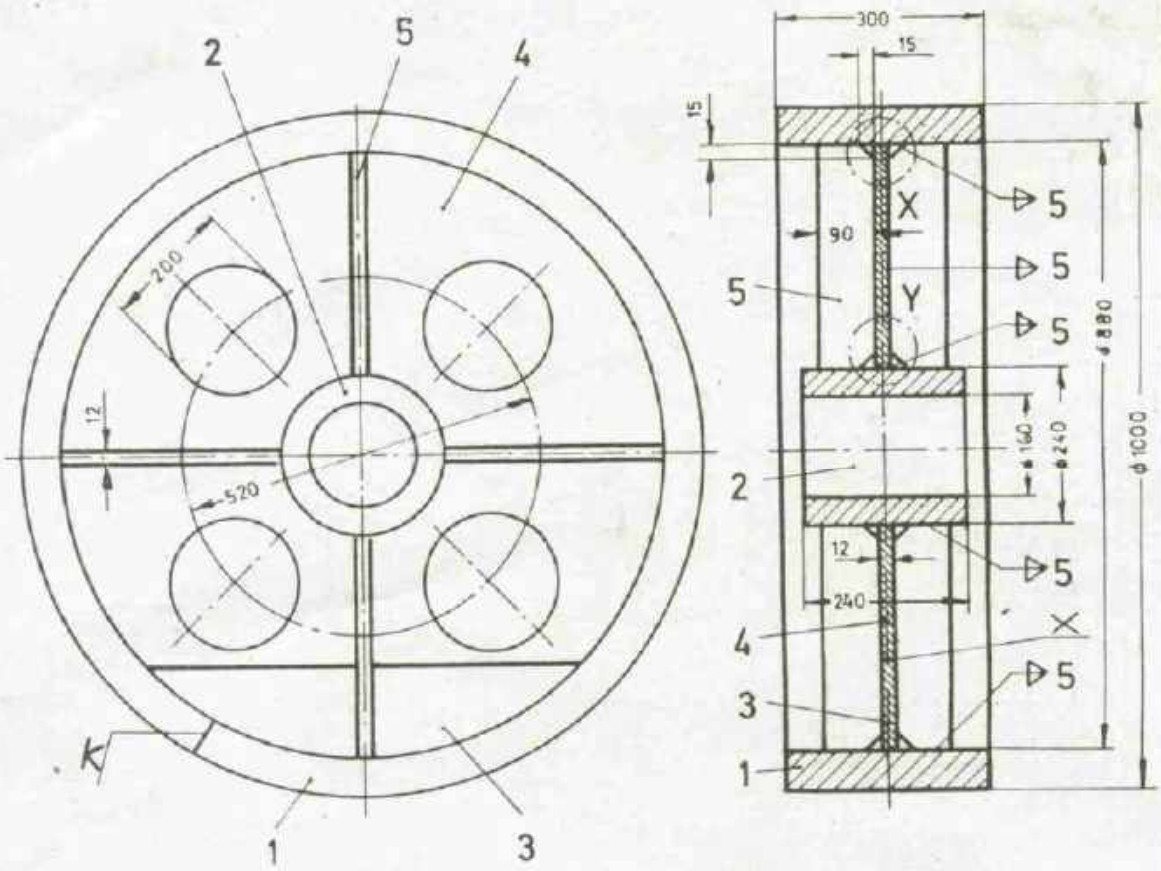
single fillet, thickness = 5mm



part 1 with part 2 : X-butt weld
part 2 with p. 3 : Double fillet concave thick. = 5mm

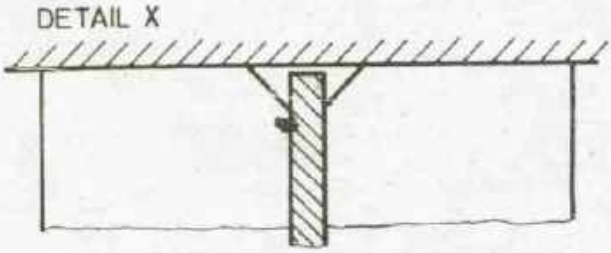


Welded Jobs -Flywheel-

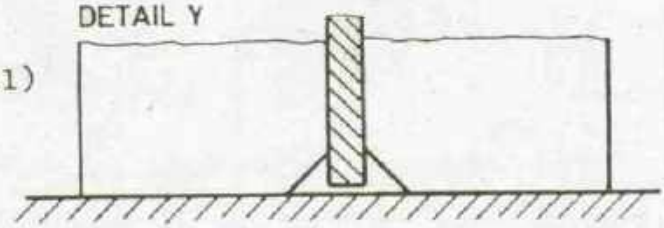


Exercises:

I. Enter the necessary welding symbols (symbolic) into the elevation view of the Flywheel.

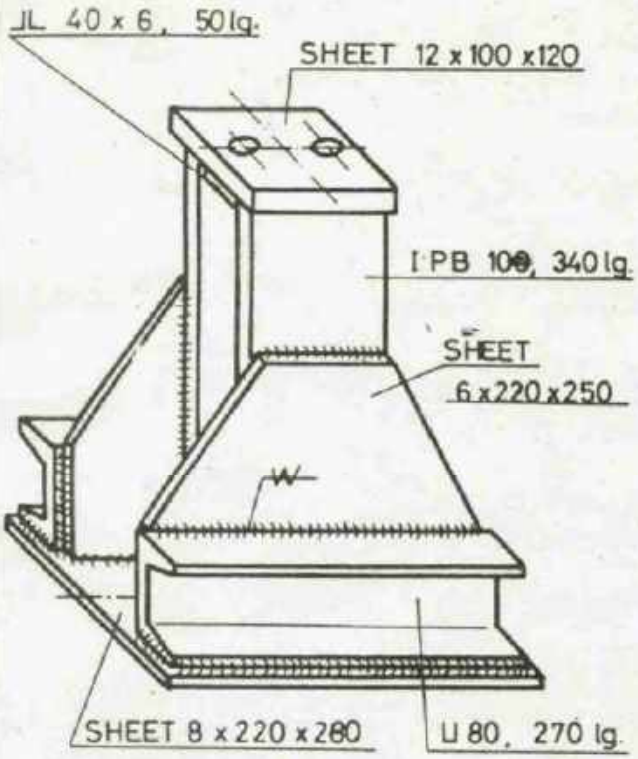


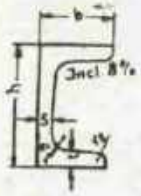
II. Enter the necessary welding symbols (pictorial) into the enlarged detail views X and Y



Scale 1 : 10
1 : 2,5

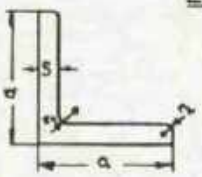
Welded Jobs -Structural Shapes-





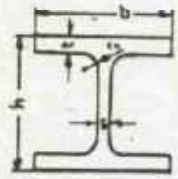
STANDARD CHANNEL
e.g. U 100

h	b	s	t	r_1	r_2
80	45	6	8	8	4



EQUALSIDED ANGLE STEEL
e.g. L 40 x 6

a	s	r_1	r_2
40	6	6	3



H-BEAM I PB
e.g. I PB 100

h	b	s	t	r_1
100	100	6	10	12

The elevation view of the above Stand is represented on sheet No.47A

Exercises:

I. Complete the side view. (sheet 47 A)

II. Draw the section A-B. on the right hand side of this sheet)

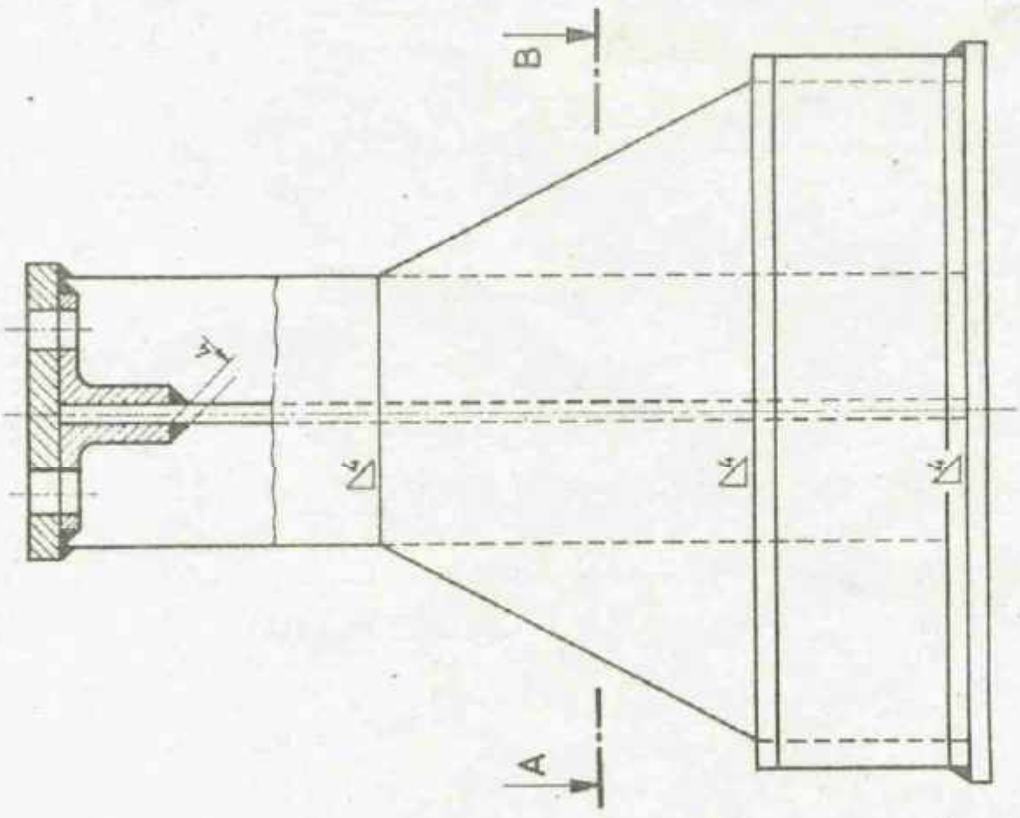
III. Enter the welding symbols.

SECTION A-B

SCALE 1:2,5

Welded Jobs -Structural Shapes

STAND Scale 1:2,5



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical Drawing

No. 48

Drawing from Models

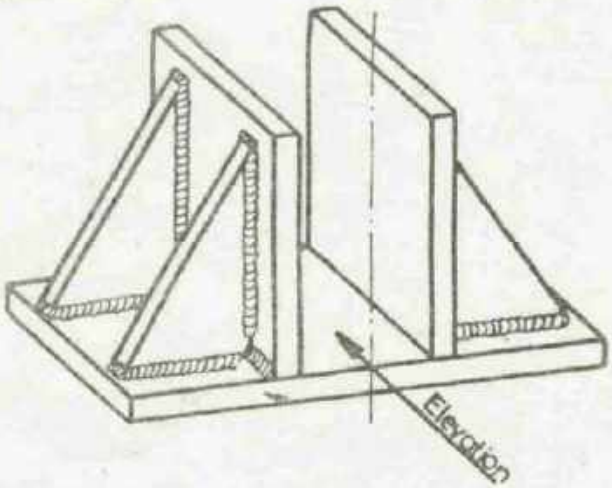
-Welded Structural Shape-

Exercise:

Draw the Guide in three views
(elevation sectioned).

Enter the welding symbols (symbolic).
Thickness of welds:
triangular ribs = 3 mm
guide plates = 5 mm.

Scale 1:2,5

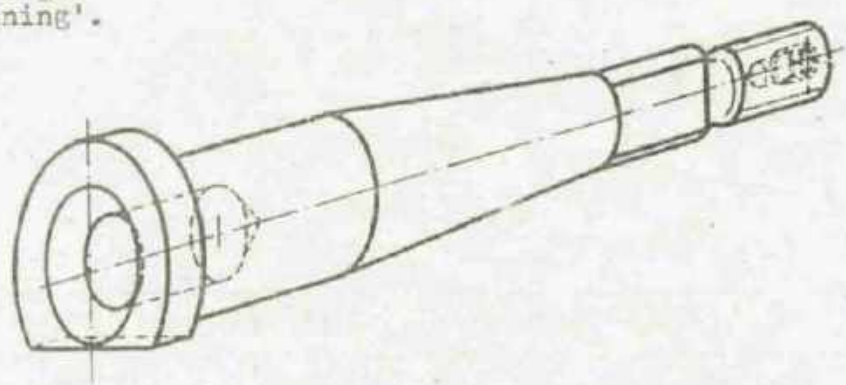


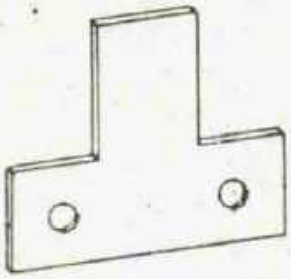
-Axle-

Exercise:

Draw the Axle in three views.
The hollow spaces have to be
shown in partial sections.
The dia 25 mm has to be machined
to a tolerance of -0.05mm.
The surfaces of this cylindrical
portion and of the cone are of the
quality 'fine machining'. All
other surfaces get
'smooth machining'.

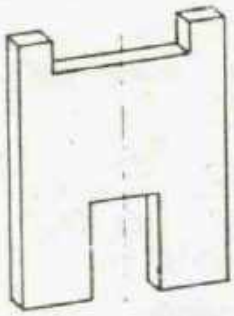
Scale 1:1





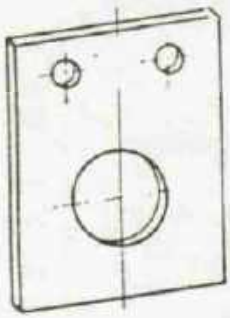
Task

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 70x80mm, sheet thickness = 5 mm
Reference lines for dimensioning vertical centre line and lower edge Upper edge = 30 mm, step = 30 mm high, distance of holes from each others = 50 mm, from below = 15 mm, hole dia = 10 mm



Task

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 60x80 mm, sheet thickness = 10mm
Reference lines for dimensioning centre line and lower edge Lower job = 20 x 30 mm, upper job = 40 mm wide 70 mm from below



Task

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 60x80 mm, sheet thickness = 8mm
Reference line for dimensioning centre line for the big hole, distance of reference line from the lower edge = 30 mm, pitch of upper holes = 30 mm, from the reference line = 40 mm, diameter of the big hole = 30 mm and the small holes dia = 10 mm

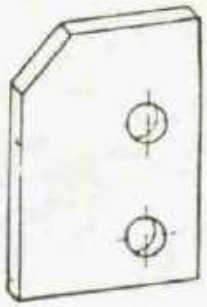
DIMENSIONING OF FLAT WORKPIECES

Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

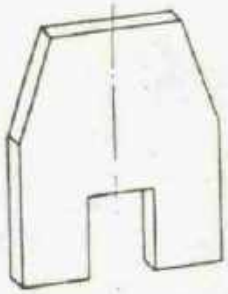
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No. 1



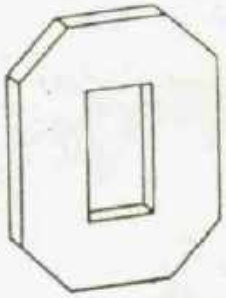
Task:

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 55 x 80 mm, sheet thickness = 10 mm
Reference lines for dimensioning lower and right edge Left edge = 65, upper edge = 40, pitch of holes from right = 15 from below = 15 and 50 mm, hole dia = 12 mm



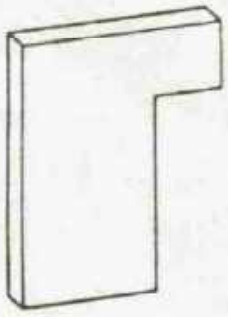
Task:

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 60 x 80 mm, sheet thickness = 10 mm
Reference lines for dimensioning centre line and lower edge
Left and right edge = 55 mm, upper edge = 40 mm,
job = 20x35 mm



Task:

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 60x80 mm, sheet thickness = 10 mm
Reference lines for dimensioning centre lines Left and right edge = 50, upper and lower edge = 30 mm, breaking through = 20x40 mm



Task:

Draw one view of the given workpiece Scale 1:1
Basic form rectangle 60 x 80 mm, sheet thickness = 12 mm
Reference lines for dimensioning: lower and right edge,
job = 20x60 mm.

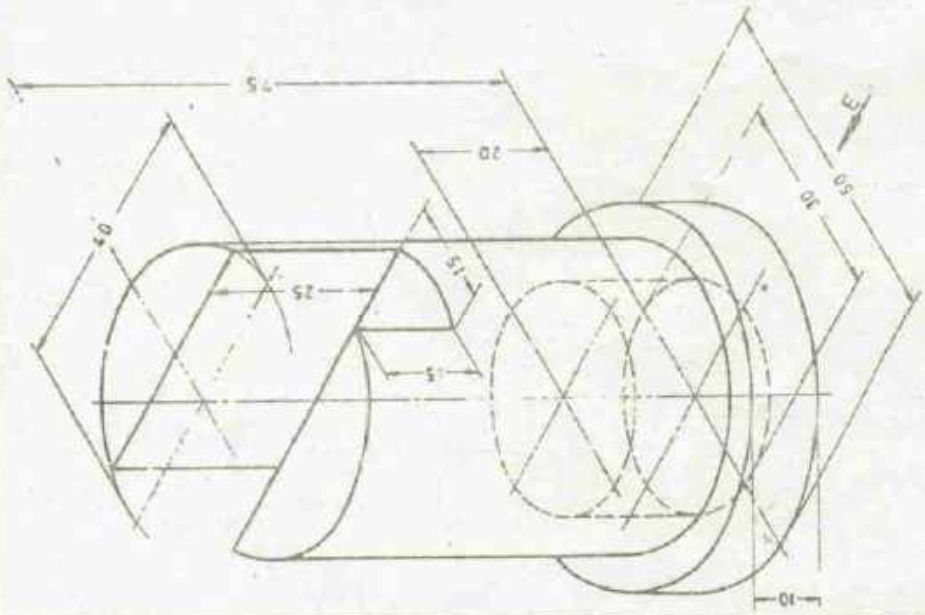
DIMENSIONING OF FLAT WORKPIECES

Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No II.



Task

Draw the three views.
Elevation and side views in full section
Scale 1:1

Scale	CYLINDRICAL BODIES		RECTANGULAR CUTS
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No XI

Fig 1

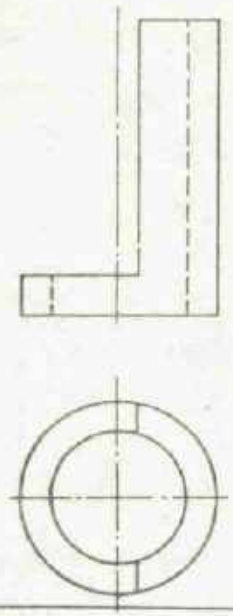


Fig 2

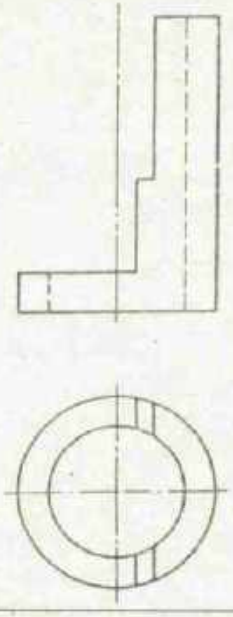


Fig.3

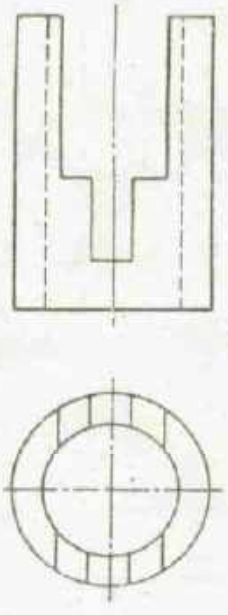
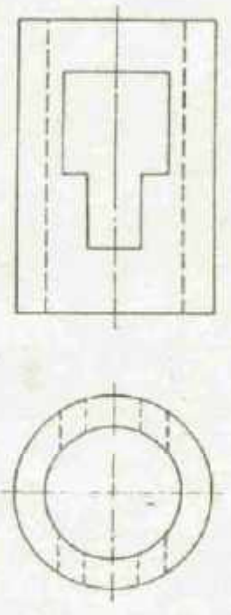


Fig 4



Task:

Draw the side views of all figures.
Dimensions are not required

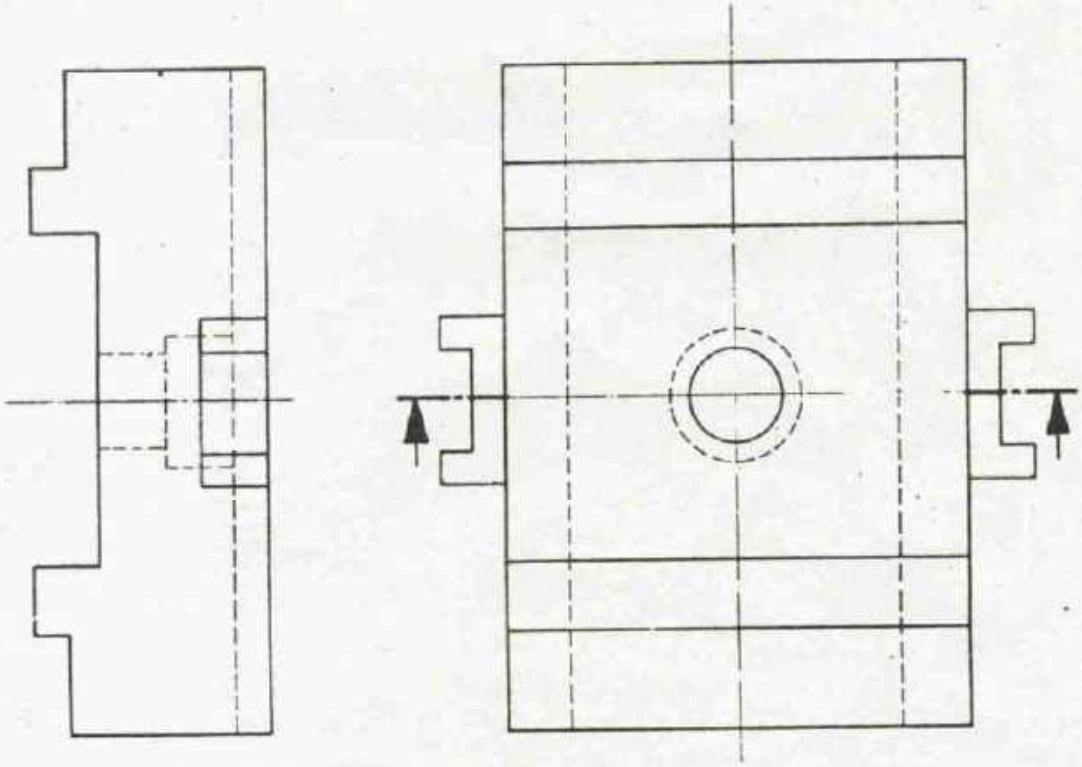
Scale 1:2	CYLINDRICAL JOBS · RECTANGULAR CUTS		
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises XII

Task: Draw the sectional side view and enter all necessary dimensions

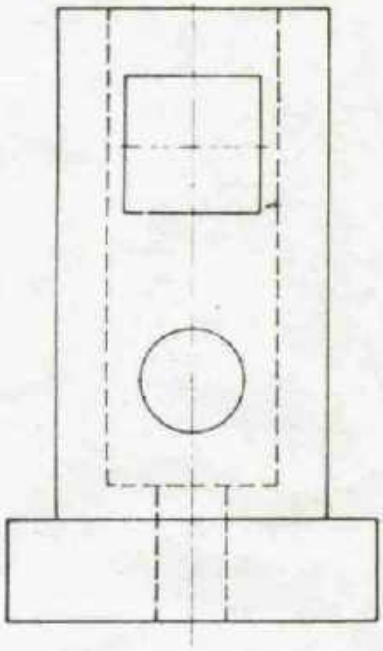


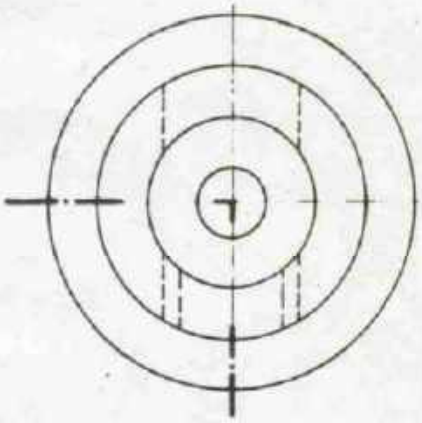
Scale 1:1	SECTIONS		FULL SECTION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No XIII





Task:

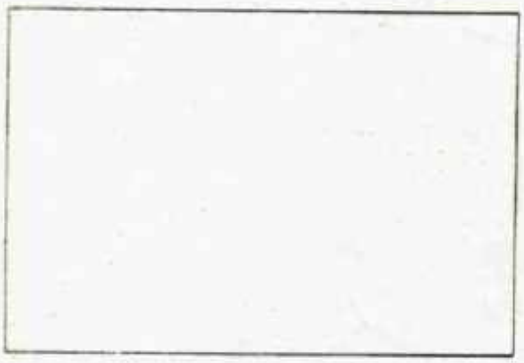
Draw the sectional side view
Enter the necessary dimensions
according to standards

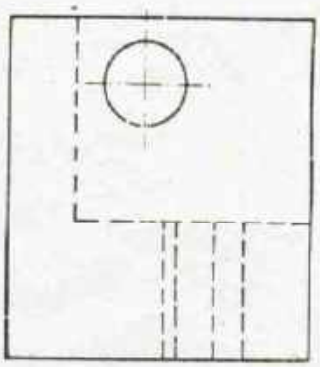
Scale 1:2	SECTIONS		HALF SECTION
Drawn	Name Date	Checked	Name Date

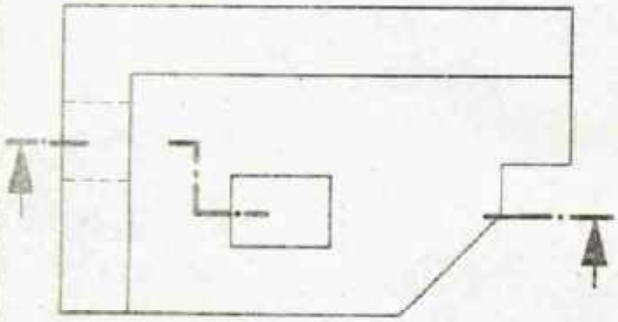
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

FAK GERMAN TECHNICAL TRAINING ORGANISATION

Additional Exercises No. XVI







Task

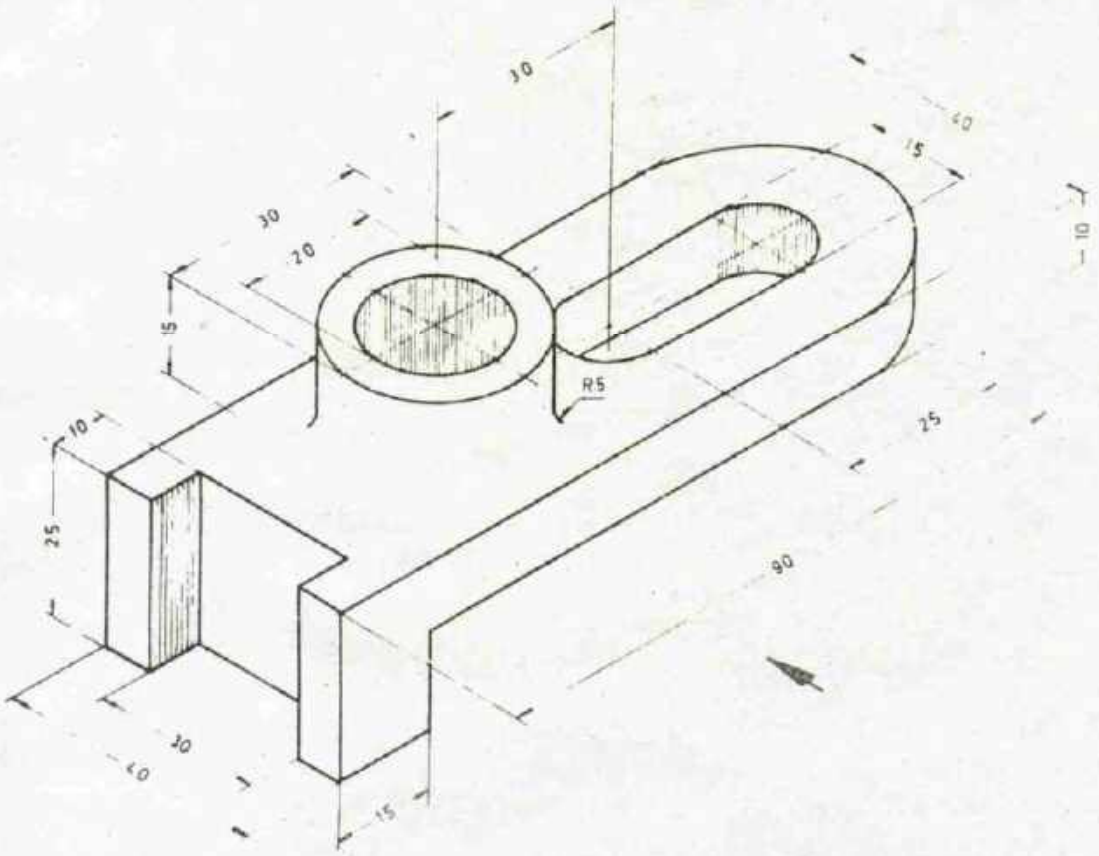
Complete the sectional elevation view and enter the necessary dimensions

Scale 1:1	SECTIONS		OFF - SET SECTION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK - GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No. XVII



Task:

Draw the three views (elevation in full section) according to the given isometric sketch

The elevation is indicated by the arrow's direction. Scale 1:1

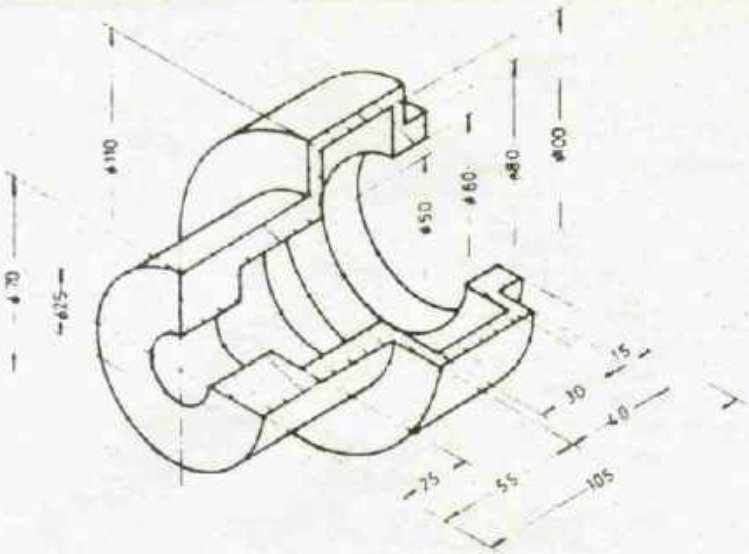
Enter all necessary dimensions

Scale 1:1	SECTIONS		FULL SECTION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

NO. XIV



Task

Draw the half sectional elevation view of the above given workpiece in full scale. Enter the necessary dimensions.

Scale 1:1	SECTIONS		HALF SECTION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No. XV

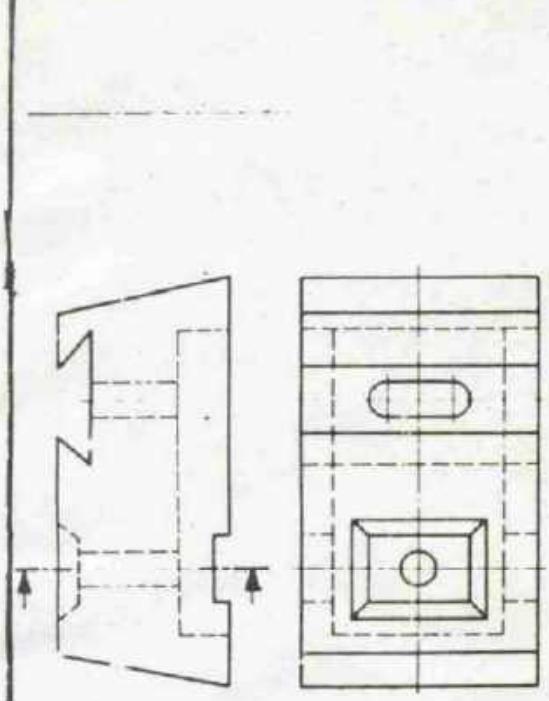


Fig 1

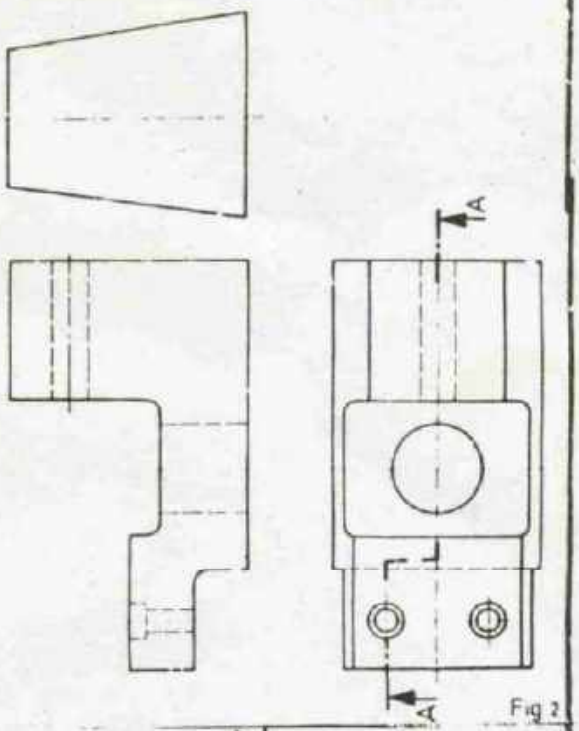


Fig 2

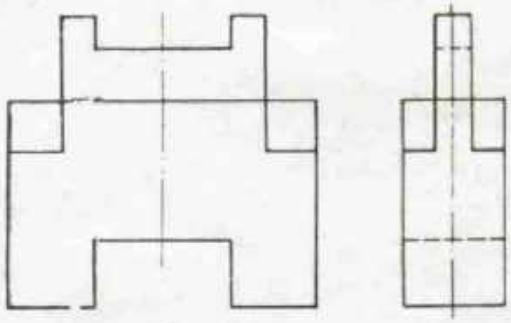


Fig 3

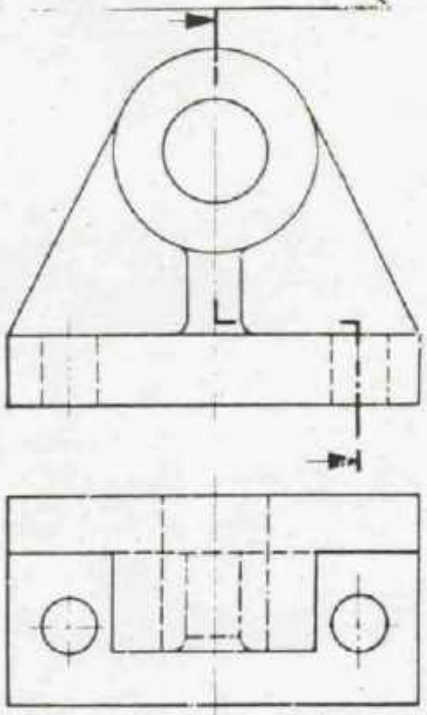


Fig 4

Task

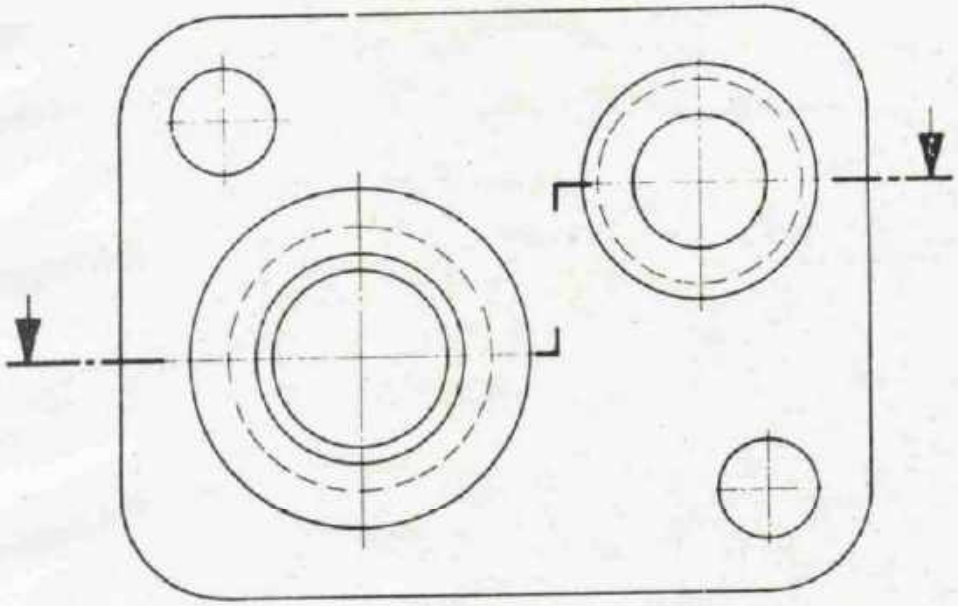
Draw,
Fig 1- Sectional elevation and side view Fig 2-Complete side view and show section A-A
Fig 3- Plan view Fig 4- Sectional side view and complete plan view

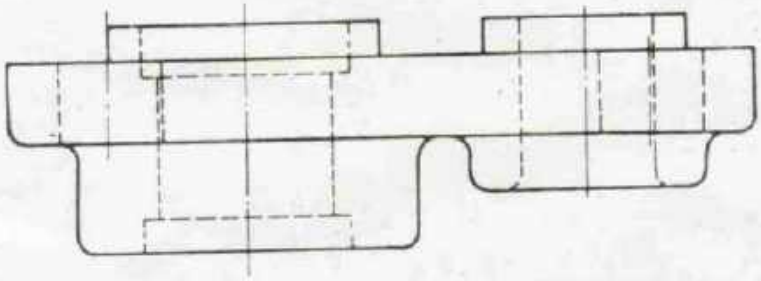
Scale 1:2	SECTIONS		JOBS IN SECTIONAL REPRESENTATION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No XX





Task:
Draw the sectional plan view and enter the necessary dimensions

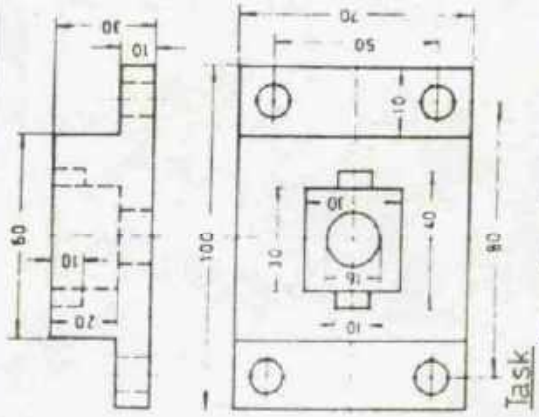
Scale 1:1	SECTIONS		OFF-SET SECTION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

Additional Exercises No.XVIII

Fig. 1

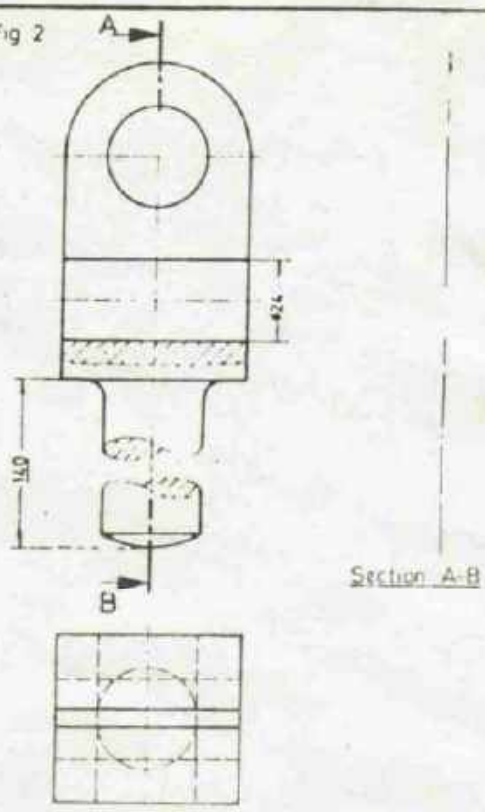


Draw the side view in full section.

Task

Section G-G

Fig 2



Section A-B

Fig 3

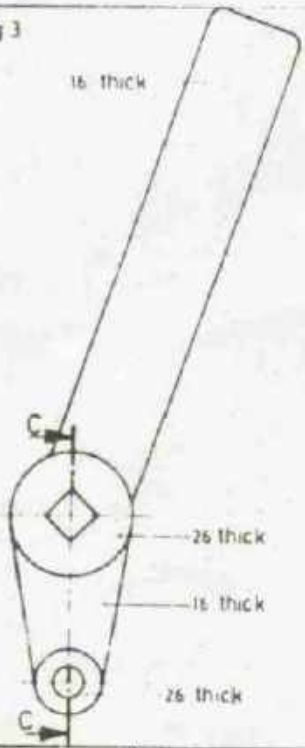
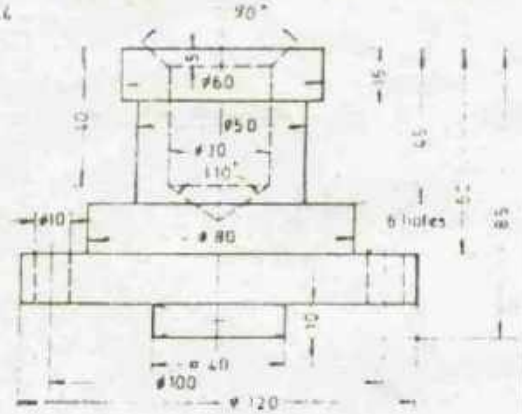


Fig 4



Task:

Elevation in half section
Plan view
Side view is not required

Task (Fig 2.3)

Draw the required sectional views without dimensions

Scale 1 2	SECTIONS		JOBS IN SECTIONAL REPRESENTATION
Drawn	Name Date	Checked	Name Date

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAN AFRICAN TECHNICAL TRAINING PROGRAMME

Metric unit
Exercise
No. XIX